Chapter 3
Affected Environment

Introduction

Chapter 3 examines the existing environment in the Silvies Canyon Watershed Restoration Project Area that might be affected by implementing the proposed EIS alternatives. It is a summary of the physical and biological setting of the project area, its social and economic characteristics, and factors affecting its resources. The following resources are discussed:

- Access and Travel Management
- Roadless Area
- Watershed/Fish Habitat
    - Soils
- Vegetation
    - Fire and Fuels
    - Sensitive Plants
    - Range Resources
    - Noxious Weeds
- Socio-Economics
- Wildlife Habitat
- Recreation
- Cultural Resources
- Scenery Management

Silvies River

Access and Travel Management

There are approximately 375 miles of roads within the Silvies Canyon project area. Of these, approximately 63 miles were either previously identified as closed, proposed to be closed under past environmental documents, historic closures, or breached closures. Decisions to close these 63 miles of roads have already been made. These roads will be treated for self-maintaining drainage structures and closed.

Most of the existing roads were constructed during timber sale entries since the 1940s. Some of these roads have subsequently been reconstructed to higher standards. Most roads are in good to fair condition. There are a few roads or portions of roads in poor condition and some are contributing sediment to streams.

The primary uses of roads in the project area have been logging or logging-related activities, hunting, sightseeing, and administrative uses. The open road densities within the project area are currently above Forest Plan standards, averaging 2.4 mi/mi² in big game winter range, and 3.7 mi/mi² in summer range.

Table 3-1. **Road Densities.**

Subwatershed	Summer Range (mi/m²)	Winter Range (mi/ m²)
Boulder Cr./Fawn Cr.	2.8	2.1
Burnt Mountain	**3.9**	2.2
Myrtle Creek	**5.2**	1.9
Myrtle Park	**4.0**	<0.1
Red Hill (project area only)	**3.8**	**2.9**
Sage Hen Creek	3.1	**2.9**
Stancliffe Creek	3.0	**3.7**
Project Area TOTAL	**3.7**	**2.4**
Forest Plan Standard*	**3.2**	**2.2**

Does not meet Forest Plan standards

* Forest Plan does not have a standard for road densities by subwatershed, however, these are above the watershed standard.

Riparian Habitat Conservation Areas and Roads

There are approximately 33 miles of roads that are within riparian habitat conservation areas. These roads cross or parallel several tributaries within the Silvies Canyon project area. There is potential for sedimentation from portions of these roads, because of the lack of vegetative cover between the road and stream, grade of road, or lack of adequate drainage. Table 3-3 lists 12 roads that are impacting aquatic habitat.

Remaining roads are located mid-slope or on ridge tops and are not actively contributing sediment to the streams. However, due to the type of soils present in the project area and that most roads are native surfaced and receive limited road maintenance, soil run-off is occurring.

Maintenance Levels

Road maintenance on the Malheur National Forest is based on traffic use. Out of the five road maintenance levels currently in use, four levels apply within the Silvies Canyon project area:

- **Maintenance Level 1:** Basic custodial care as required to protect the road investment and to see that damage to adjacent land and resources are held to a minimum. The road is not open to traffic.
- **Maintenance Level 2:** Same basic maintenance as Level 1, plus logging out, brushing out, and restoring the road prism as necessary to provide passage for high clearance vehicles. Route markers and regulation signs are in place and useable. Road is open for limited passage of traffic, which is usually administrative use, permitted use, and/or specialized traffic.
- **Maintenance Level 3:** Road is maintained for safe and moderately convenient travel suitable for passenger cars. Road is open for public travel, but has low traffic volumes except during short periods of time, such as hunting season.
- **Maintenance Level 4:** At this level, more consideration is given to the comfort of the user. Road is usually surfaced with aggregate or is paved and is open for public travel.

Traffic Service Levels

Traffic service levels describe a road's significant characteristics and operating conditions. These levels are identified as a result of transportation planning activities. Traffic service level characteristics include the road width, shoulders, curve widening, sight distance, turnout spacing, design speed, surface type, restrictions, and future maintenance level (FSH 7709.56, section 4.14). Most roads within the project area are traffic service level D, which is inclusive of most Maintenance Level 2 roads. These roads were built for high clearance vehicles with little mixed vehicle traffic. They are single lane with limited turnouts, designed for slow vehicle speeds. Forest Roads 31, 3125, 3140, 37, 3765, 3746, and a portion of the 3130 are traffic service level C, which is inclusive of all the Maintenance Level 3 and 4 roads. These roads were built for more mixed vehicle traffic with more turnouts and generally better alignment.

Myrtle-Silvies Roadless Area

The Myrtle-Silvies Roadless Area was inventoried in the Roadless Area Review and Evaluation (RARE) process (RARE Final Environmental Impact Statement, October 1973) and again in RARE II (Final Environmental Impact Statement, January 1979). The Forest Plan reevaluated the Myrtle-Silvies Roadless Area and, after considering the area's capability as wilderness, recommended the area for non-wilderness management. The Forest Plan modified the Myrtle-Silvies Roadless Area boundary to those areas that still conform to wilderness definitions (Figure 3-1) and allocated the area for management as follows:

- 9855 Acres in MA 10 – Semi-Primitive Non-Motorized Recreation Areas
- 1067 Acres in MA 1/2 - General Forest/Rangeland
- 93 Acres in MA 3A – Non-Anadromous Riparian Areas
- 590 Acres in MA 4A – Big Game Winter Range Maintenance
- 142 Acres in MA 16 – Minimum Level Management

The Record of Decision for the Forest Plan states that the portion of the Myrtle-Silvies roadless area that is within the semi-primitive non-motorized area is to be managed with no scheduled timber harvest and in an unroaded condition, but for multiple use.

Besides the Myrtle-Silvies Roadless Area, there are no contiguous 1000-acre or greater blocks of unroaded area within the project area.

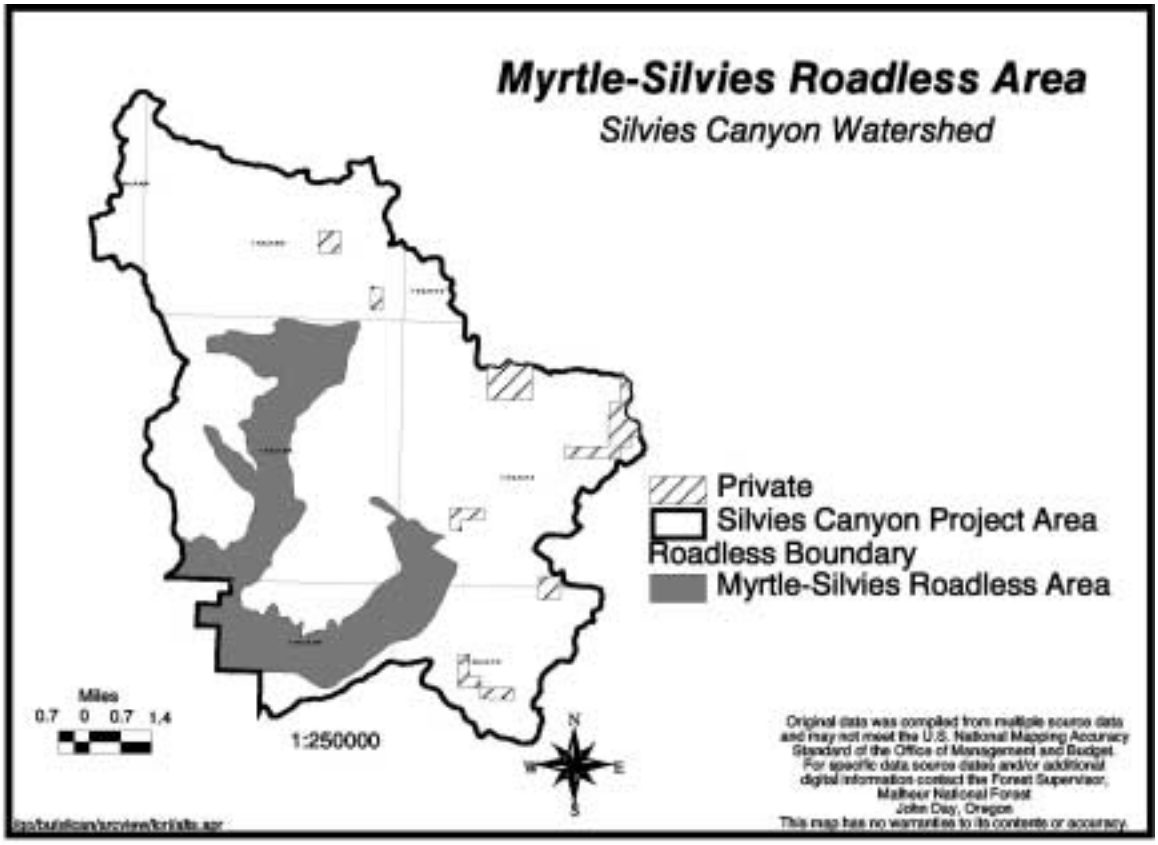


Figure 3-1. Myrtle-Silvies Roadless Area – Location of the Myrtle-Silvies Roadless Area and Former RARE II Study Area 6232.

Historic and Current Uses

Historic activities in the Myrtle-Silvies Roadless Area included homesteading, mining, grazing, timber harvest, and road construction and use.

Big-game hunting and fishing are currently the primary recreational uses of the area. Other uses include Silvies river rafting or canoeing during the spring high water periods, picnicking, camping, horseback riding, hiking, recreational gold panning, photography, and nature study. All recreational use in the area is light. Access is limited to trails that follow the stream courses; these are generally at a gentle grade and suitable for an average hiker. For more information on recreational use refer to the section titled "Recreation."

This area provides year round Rocky Mountain elk habitat with winter range encompassing the entire area. Mule deer are in the area during spring, summer, and fall. The canyon rims provide habitat for black bear, bobcat, Canada geese, prairie falcon, and turkey vulture. The area provides for a wide spectrum of wildlife viewing, as the canyons support riparian, cliff, and montane habitat in close proximity. Most bird and mammal species associated with the southern Blue Mountains can be found in the area.

The Myrtle-Silvies Roadless Area lies within four grazing allotments, West Myrtle, Rainbow, Scatfield and Myrtle. For more information on grazing allotments refer to the section titled "Range Resources."

The major attraction of this area, in addition to hunting and fishing opportunities, is simply a place to "get away from it all" and enjoy "peace and quiet without motorized intrusions."

Natural Integrity

Within the river canyons, natural integrity of the area is extremely high. Natural processes have been virtually unhampered by human activities with the exception of trail maintenance, livestock grazing, fire management, a few unimproved roads, and camping and associated activities. Recently, off highway vehicle (OHV) use has become a concern. Not only is this type of use inconsistent with the Forest Plan, but also a cause of soil erosion and sedimentation.

Fire suppression in the area has caused a gradual change in the understory vegetation from ponderosa pine to white fir and other tree species. Under natural conditions, low intensity wildfires would have selectively maintained ponderosa pine in the understories.

The effects of grazing in the area are mostly concentrated along streams. They include fences, salt grounds, cattle trails, some compaction and vegetation trampling, dust beds, and presence of cattle along the streams.

There is one unimproved road (Forest Road 3100035) for several miles along the Silvies River. This is utilized for one mile until after spring runoff, at which time it is possible to ford the Silvies River and travel an additional two miles with OHVs. This road was identified for closure in the Forest Plan. This closure was breached, and then closed again in 2001. There are two other unimproved roads (Forest Roads 3110224 and 3110111) in the southwest corner of the roadless area that provide access to private property.

Naturalness

Overall, the area appears extremely natural to the average user. Most users would not normally notice the effects of fire suppression. The impacts of the unimproved roads are localized to those two areas. Foot trails along streams are maintained to a fairly low standard.

The evidence of livestock grazing and OHV use remain the most intrusive activities. Cattle grazing appears unnatural to some visitors and would be extremely difficult to mitigate unless grazing were eliminated. Livestock grazing occurs in the portion of the area most likely to receive a majority of visitor use. OHV use is a recent development and can cause resource damage; this use is inconsistent with management direction for the area.

Opportunity for Solitude

Within the canyons, opportunities for solitude are very high, especially along stream bottoms. The depth of the canyons and the vegetative cover provide excellent screening. Rim tops offer limited opportunity for solitude and viewing the canyons. The views give an impression of a vast, unspoiled canyon area, but intrusions from the adjacent tablelands occur, especially during hunting season.

Primitive Recreation and Challenge

Overall, Primitive recreation opportunities are limited by the narrowness and irregular shape of the area. Topographic and vegetative cover are significant over much of the area, and trails tend to concentrate users in stream bottoms or on canyon rims. Trails are the only recreation facility present and they are low standard. They are not difficult, however, as they follow the moderate stream grade.

The lack of facilities and access tends to increase opportunities for solitude and unconfined recreation. Challenge to physical ability would be classified as moderate to high, particularly for the areas with rock cliffs and very steep slopes.

Special Features

There is scenic variety both vertically, from rim tops to canyon bottoms, and horizontally as the scene changes between microhabitats.

Much of the forest in the canyons provides old growth. Bald eagles forage along Silvies River but no other threatened or endangered species are known to use the area. There is potential for bald eagle winter roosts at the mouth of both Silvies and Myrtle Canyons, and low potential for peregrine falcon nest sites. Redband trout, a sensitive species, is known to occur in the area.

American Indians occupied Myrtle and Silvies Canyons at various times. A cultural resource survey was conducted in Myrtle Canyon in 1980; isolated chips and flakes were found. No historic sites were found. A cultural resource survey was conducted in the Silvies River Canyon in 1995; numerous prehistoric, historic, and isolates were found.

Watershed/Fish Habitat

The Silvies Canyon project area is in the semiarid rain shadow of the Cascade Mountains. Elevations range from 5,000 to 6,400 ft above sea level. The area has both marine and continental climate patterns with most of its precipitation occurring from November through March, primarily in the form of snow. Precipitation ranges from 20 to 30 inches per year. Thunderstorms provide some rain in the summer, although the summers are relatively dry and have periods of no measurable precipitation.

The streams in the project area fall within Management Area 3A, Non-anadromous riparian areas. Streams include Myrtle Creek, North Fork Myrtle Creek, South Fork Myrtle Creek, West Myrtle Creek, Sage Hen Creek, Stancliffe Creek, Cooley Creek, and the Silvies River. Stream surveys have been completed on a little more than half of the fish bearing streams in the project area. Surveys have determined the presence of eleven native and seven introduced fish species in the project area.

Native Species:

- Redband trout
- Redside shiner
- Longnose dace
- Speckled dace
- Chiselmouth chub
- Tui chub
- Northern pikeminnow
- Columbia mottled sculpin
- Malheur mottled sculpin
- Largescale sucker
- Bridgelip sucker

Introduced Species:

- Rainbow trout
- Brook trout
- Brown bullhead
- Carp
- Pumpkinseed
- Small mouth bass
- Yellow perch

Proposed, Endangered, Threatened or Sensitive Fish Species

Redband trout are a Region 6 sensitive species and a Malheur NF management indicator species. Redband trout were petitioned to be listed as a threatened or endangered species under the Endangered Species Act in 1998. The U.S. Fish and Wildlife Service determined on March 20, 2000, that they were not warranted for listing as a threatened or endangered species. Redband trout are widely distributed in the project area, occupying both perennial and intermittent streams.

Malheur mottled sculpin is a Federal Species of Concern, a Region 6 sensitive species, and a Malheur NF management indicator species. This species is currently present in the Silvies River.

Existing Habitat Conditions

Riparian management objectives (RMOs) are identified in Amendment 29 to the Forest Plan for attaining desired future conditions for aquatic habitat on the Malheur NF. The Forest Plan was subsequently amended by INFISH in 1995. However, Forest Plan RMOs were retained whenever they were more protective and/or more site specific. For this analysis the appropriate RMOs are identified as either Forest Plan Amendment 29 or INFISH. Amendment 29 identifies the following aquatic habitat elements.

Water Quality

Within the project area, on-site uses of water are for fisheries (redband trout) and other aquatic species, terrestrial wildlife, livestock and road watering. Downstream uses are similar, but also include habitat for sculpin and irrigation for agricultural purposes. Myrtle Creek, West Myrtle Creek, Sage Hen Creek, Stancliffe Creek, and the Silvies River are the primary perennial fish-bearing streams in the project area.

Water Temperature

Stream temperatures are out of compliance with the State standards when any maximum 7-day temperature average exceeds 64.0°F. Myrtle Creek, Stancliffe Creek and the Silvies River have been monitored for water temperature and all have exceeded the maximum water temperature standards established by ODEQ at least once during the period of 1995-1999. To date, Myrtle Creek is listed on the 303(d) list for not meeting temperature standards (Reference Map #29).

The 2000 Silvies Canyon Watershed Analysis identified elevated water temperatures associated with streams that are wider and shallower than they were historically. This is a result of past heavy livestock grazing during the first part of the 20th century, road building which has affected the hydrologic and sediment regimes, and past logging within riparian areas. Current grazing management has allowed some reaches to improve and develop an upward trend; however, more than half of the reaches are still classified as functioning-at-risk (FAR) (Silvies Canyon WA 2000) and contribute to higher stream temperatures due to lack of shade.

Sediment/Substrate

A high degree of embeddedness is a sign that the watershed is producing an excessive amount of sediment to the stream system. Sediment reduces a stream's ability to provide important aquatic insect and fish spawning habitat. Results of past stream surveys within the Silvies Canyon project area show that some sections of streams have appropriate levels of substrate embeddedness, while others were found to have a high degree (>30%) of embeddedness. Streams with reaches found to have a high degree of embeddedness based on pebble count data include Sage Hen Creek, West Myrtle Creek and Myrtle Creek.

Channel Stability

Stream bank stability ratings from contracted level II stream surveys documented relatively stable streambanks (generally over 80% stable), whereas field observations by Forest Service hydrologists and fisheries biologists indicate that stream bank stability ratings from contracted stream surveys are overestimated. High embeddedness levels from pebble count data supports USFS field observations. Roads and other types of disturbed ground (such as skid trails, landings, and dispersed campgrounds), as well as documented unstable banks, are all contributing to current sediment levels in streams.

Channel Morphology/Large Woody Material

Forest Plan Amendment 29 sets RMOs for large wood in streams by ecosystem. Three ecosystems are used to classify stream reaches: ponderosa pine, mixed conifer, and lodgepole pine. In addition to these three ecosystems, stream reaches also occur in meadow ecosystems where potential recruitment of large wood from the adjacent riparian area is low. For stream reaches that occur in meadow ecosystems the default INFISH RMO for large wood was used. For stream reaches that occurred in a combination of ecosystems, the dominant ecosystem RMO was used. Large wood is defined as >12" diameter and >35' long. Three of the 28 surveyed stream reaches meet Forest Plan RMOs for large wood (see Table 3-2 and Reference Map #33).

Large wood in streams in the Silvies Project Area is naturally low and generally does not meet Forest Plan RMOs due to two factors:

- Much of the riparian areas are meadows where the potential for recruiting large wood into the channel is low and large wood must be recruited from forested areas upstream. Approximately 59% of the surveyed stream reaches in the project area are within meadows or meadows are the predominant riparian ecosystem type.

- Large wood RMOs in Forest Plan Amendment 29 may overestimate the potential for large wood in the Silvies Canyon project area. Forest Plan Amendment 29 RMOs for large wood were developed using data from research papers, local research in the upper M.F. John Day River watershed, and professional judgment of Forest staff (R. Gritz pers. com.). However, the southern portion of the Malheur Forest has historically been less productive than the northern portions. The area was historically (prior to 1900) less forested than presently. Approximately 20,000 acres were non-forested in the project area compared to the approximately 15,000 acres that are presently classified as non-forested. Trees 80 to 100 years old that correspond to the expansion of forested areas in the project area are currently 10 to 16" dbh (R. Schwenke pers. comm.). These trees are now just reaching the size class to be considered as potential large wood.

Table 3-2. **Existing large woody material per mile by stream reach[1].**

Stream	Reach	Ecosystem[2]	Existing LWM pieces/mi	Amendment 29 RMO pieces/mi	INFISH RMO pieces/mi
Silvies River	Silv-1	Meadow/P-Pine	No Data	20 -70	20
	Silv-2	Meadow/P-Pine	No Data	20 -70	20
	Silv-3	Meadow/P-Pine	0	20 -70	20
	Silv-4	Meadow/P-Pine	3	20 -70	20
	Silv-5	Meadow/P-Pine	0	20 -70	20
Stancliffe Ck.	Stan-1	Mixed Conifer	8	80 -120	20
	Stan-2	Meadow/P-Pine	17	20 -70	20
	Stan-3	Meadow/P-Pine	0	20 -70	20
Sage Hen Ck.	Sage-1	Meadow	3	No Standard	20
	Sage-2	Meadow	0	No Standard	20
	Sage-3	P-Pine	3	20 -70	20
	Sage-4	Meadow/P-Pine	4	20 -70	20
	Sage-5	P-Pine	16	20 -70	20
Myrtle Ck.	Myrt-1	Mixed Con/Meadow	12	80 -120	20
	Myrt-2	Mixed Conifer	20	80 -120	20
	Myrt-3	Mixed Conifer	20	80 -120	20
	Myrt-4	Mixed Conifer	16	80 -120	20
	Myrt-5	Meadow	3	No Standard	20
	Myrt-6	Meadow/ Mixed Con	**25**	80 -120	20
	Myrt-7	Meadow	0	No Standard	20
	Myrt-8	Meadow/ Mixed Con	**20**	80 -120	20
N.F. Myrtle Ck.	MyrNF-1	Meadow/ Mixed Con	17	80 -120	20
	MyrNF-2	Meadow/ Mixed Con	3	80 -120	20
S.F. Myrtle Ck.	MyrSF-1	Mixed Con/Meadow	24	80 -120	20
	MyrSF-2	Mixed Con/Meadow	75	80 -120	20
West Myrtle Ck.	WMyr-1	Mixed Conifer	71	80 -120	20
	WMyr-2	Meadow/ Mixed Con	**99**	80 -120	20
Cooley Ck.	Cool-1	Mixed Conifer	77	80 -120	20

[1]Numbers in bold indicate reaches which are meeting or exceeding RMOs.
[2]Where two ecosystems are listed, the dominant ecosystem is listed first.

Pool Frequency

Forest Plan Amendment 29 RMOs for pools per mile were developed from Rosgen (1994). These RMOs reflect the potential for pools per mile based on channel morphology. Many of the stream reaches in the project area are 'C' type channels, where the primary pool forming process is fluvial and pools are formed at meander bends (Rosgen 1996). Reduction in pools reflects loss of sinuosity of 'C' type channels. Six of the 28 surveyed stream reaches meet Forest Plan RMOs for pool frequencies (See Table 3-3 and Reference Map #34).

The low number of stream reaches meeting RMOs indicates that management activities have reduced the quantity of pool habitat in the project area. Management activities that have reduced pool habitat include livestock grazing and road construction along 'C' and 'E' type channels.

Many of the stream reaches that are currently 'C' type channels were probably historically 'E' type channels. These channels have shifted to 'C' type channels in response to management activities, including, timber harvesting, road construction and grazing. 'C' type channels have a lower potential for pool habitat because they are less sinuous than 'E' type channels, and have larger width to depth ratios which can result in shallower pools compared to 'E' type channels.

Many channels in the project area have been rated on their channel stability, sensitivity to disturbance, streambank erosion potential and vegetation influence. Table 3-4 describes these data.

Table 3-3. **Comparison of existing pools per mile to Forest Plan Amendment 29 RMOs[1].**

Stream	Reach	Channel Type	Existing Pools/mi	Amend 29 RMO (pools/mi)
Silvies River	Silv-1	C	No Data	15 - 26
	Silv-2	C	No Data	15 - 26
	Silv-3	C	**15**	15 - 26
	Silv-4	C	14	15 - 26
	Silv-5	C	**18**	15 - 26
Stancliffe Ck.	Stan-1	C	108	151 - 264
	Stan-2	B	**162**	151 - 264
	Stan-3	C	115	151 - 264
Sage Hen Ck.	Sage-1	C	**84**	38 - 66
	Sage-2	C	29	38 - 66
	Sage-3	B	20	38 - 66
	Sage-4	C	19	38 - 66
	Sage-5	C	54	75 - 132
Myrtle Ck.	Myrt-1	B	**22**	15 - 26
	Myrt-2	B	14	15 - 26
	Myrt-3	B	10	38 - 66
	Myrt-4	B	10	38 - 66
	Myrt-5	C	8	38 - 66
	Myrt-6	G	0	75 - 132
	Myrt-7	E	0	75 - 132
	Myrt-8	C	12	75 - 132
N.F. Myrtle Ck.	MyrNF-1	C	14	75 - 132
	MyrNF-2	C	9	15 - 26
S.F. Myrtle Ck.	MyrSF-1	B	24	75 - 132
	MyrSF-2	G	33	151 - 264
West Myrtle Ck.	WMyr-1	B	**50**	38 - 66
	WMyr-2	E	30	75 - 132
Cooley Ck.	Cool-1	A	47	75 - 132

[1] Numbers in bold indicate reaches that are meeting or exceeding RMOs.

Table 3-4. **Channel stability, sensitivity to disturbance, streambank erosion potential and influence of vegetation for channel types present in Silvies Canyon Watershed Restoration project area. Adapted from Rosgen 1996.**

Channel Type[1]	Channel Stability	Sensitivity to Disturbance	Streambank Erosion Potential	Vegetation Influence[2]
A (3)	Stable/Unstable	Very high	Very high	Negligible
B (3-5)	Stable	Low to moderate	Low to moderate	Moderate
C (3-5)	Stable/Unstable	Moderate to very high	Moderate to very high	Very high
E (3-6)	Stable	High to very high	Moderate to high	Very high
G (3-5)	Unstable	Very high to extreme	Very High	High

1) Number in parenthesis are the range of channel subtypes potentially present in the project area.
2) Influence of vegetation on controlling w/d ratios.

- The A stream type is a steep, deeply entrenched and confined stream channel with cobble or gravel-dominated substrates. A stream types have low sinuosity (<1.2), low width/depth ratio (<12), and slopes ranging from 0.04 to 0.09.
- The B stream type is a moderately entrenched channel in cobble or gravel-dominated substrates with moderate width/depth ratio (>12) and sinuosity (>1.2). B type stream gradients generally range from 0.02 to 0.04.
- The C stream type is a slightly entrenched, riffle/pool meandering system with high sinuosity (>1.2), gravel or cobble-dominated channel with a well-developed floodplain. Width/depth ratios are moderate to high (>12) in C type streams, and slopes range from 0.001 to 0.02.
- The E stream types are slightly entrenched channel systems with high sinuosity (>1.5), gentle to moderately steep channel gradients (<0.02), and very low width/depth ratios (<12) commonly found in broad valleys where the dominant substrate is gravel.
- The G stream type is deeply incised in depositional material primarily composed of an unconsolidated, heterogeneous mixture of cobble, gravel, and sand, thus is inherently unstable. G type streams have low width/depth ratios (<12), moderate sinuosity (>1.2), and slopes ranging from 0.02 to 0.04.

Roads and Related Problem Areas

There are nearly 375 miles of road within the project area, including 33 miles of roads in RHCAs. Many of these roads are currently in a deteriorating condition, based on information from the Silvies Canyon Road Analysis. Observations during the field review for this analysis identified two major sources of stream sediment, roads and excessive livestock grazing in the riparian area. Most roads are hydrologically connected to the stream channel via ditches and overland flow. Water, sediment, and chemical runoff generated from the road prism can enter the natural stream channel network when the road is hydrologically connected to the stream channel.

Road treatments to "disconnect" roads from streams to reduce the amount of hydrologically connected roads are usually simple and inexpensive, and effective in reducing road effects and risks to water quality and aquatic habitats. Specific roads identified for drainage improvements or other treatment to reduce erosion and sediment transport are listed in Table 3-5 (also see Map #31).

Table 3-5. **Roads Impacting Aquatic Habitat.**

Subwatershed	Forest Road	Segment	Reason
Myrtle Park 60905	3100286	31 Rd to 3100982 Rd	Contributing sediment to Heifer Cr
Myrtle Park 60905	3100864	31 Rd to 3100241 Rd	Contributing sediment to Heifer Cr
Myrtle Park 60905	3700117	3700275 Rd to 37 Rd	Contributing sediment to S.F. Myrtle Cr
Myrtle Park 60905	3700167	Entire road	Degrading wet meadow (S.F. Myrtle Cr)
Myrtle Park 60905	3700275	Entire road	Contributing sediment to S.F. Myrtle Cr
Myrtle Park 60905	3700294	Upper portion	Contributing sediment to Myrtle Cr tributary
Myrtle Park 60905	3700379	Junction of 3700187 Rd	Contributing sediment to Gribble Spr
Burnt Mtn 60913	3100035	South of Bennett Cabin	Contributing sediment to Silvies River
Sage Hen Creek 60907	3100860	31 Rd to 3100844 Rd	Contributing sediment to Sage Hen Cr
Sage Hen Creek 60907	3125244	East of L. Sagehen Flat	Contributing sediment to Little Sage Hen Cr
Sage Hen Creek 60907	3125912	3125920 Rd to 3125914 Rd	Contributing sediment to Little Sage Hen Cr
Boulder/Fawn Cr 60909	3130129	NW of Aspen Spring	Contributing sediment to Fawn Cr

Passage Barriers

The forest wide culvert survey is not scheduled for this area until after 2003, but one culvert on the 3700440 Rd was identified during stream surveys as a passage barrier for fish on Cooley Creek. This culvert may block passage to approximately ¼ mile of potential habitat on Cooley Creek.

Livestock Grazing

Livestock grazing is a contributing factor in preventing the obtainment of INFISH RMOs (pool frequency, water temperature, bank stability, lower bank angle and width/depth ratios) and Forest Plan Amendment 29 Standards (cobble Embeddedness, riparian vegetation and shade/canopy cover) on Myrtle Creek, North Fork Myrtle Creek, West Myrtle Creek, South Fork Myrtle Creek, Stancliffe Creek, Sage Hen Creek, Cooley Creek and the Silvies River. Utilization of riparian vegetation and stream bank damage from cattle grazing has contributed to the current condition on these stream reaches. Impacts from elk have been documented across the project area but not to the degree of livestock.

Cumulative Watershed Condition

The standard CWE (Cumulative Watershed Effects) methodology in use on the Malheur National Forest is the ERA (Equivalent Road Area) model. This model is based on, and modified from, the model that was created by the Eldorado National Forest in California. This model evaluates risk as a percentage of the project area that is occupied by roads by calculating the area for each activity that occurs in the project area as an equivalent road area. Actual areas of an activity (past, proposed, or future) are converted to an equivalent road area through the use of adjustment coefficients. Coefficients for past activities are adjusted downward with age to allow for natural recovery. Different activities recover at various rates and some activities do not recover at all. Coefficients and recovery rates were developed for activities that occur on the Malheur National Forest and adjusted for local climate, geomorphology, and soil characteristics.

After all activities are converted to ERAs, they are totaled by alternative and expressed as a percentage of the project area. This percentage is then compared to a threshold of concern, which is based on the natural sensitivity of the project area. The thresholds are based upon four criteria: surface soil erosion, detrimental compaction, hydrologic group, and vegetative cover.

The ERA model does not give a quantifiable number (output) for sedimentation, tons of soil eroded/detached, or any other similar item. This model does generate a risk index value that can be used to compare alternatives to each other and against the current condition. The impacted area is converted to a linear length and then multiplied by the average width of the road (including cut and fill slopes) to arrive at an acreage figure.

The total ERA for each subwatershed is divided into the total subwatershed acres, to determine what percentage of the watershed is in an ERA. This percentage is then compared to the Threshold of Concern (TOC), also a percentage of the watershed. If the ERA for each subwatershed is below the TOC, then the cumulative effects of the proposed action are not anticipated to be a problem. If the ERA approaches the TOC then cumulative effects may be of issue. If the ERA is above the TOC, then cumulative effects are anticipated to be a concern and various measures may be taken to lower the ERA. This may include: decommissioning roads, delaying proposed harvest activities to let the subwatershed recover.

The following table summarizes the existing conditions for each of the seven subwatersheds as defined by the ERA watershed cumulative effects model:

Table 3-6. **Existing Equivalent Roaded Area and Threshold of Concern.**

Subwatershed	Threshold of Concern	Existing Equivalent Roaded Area
Boulder Ck, Fawn Ck	12%	1.9%
Burnt Mountain	12%	1.4%
Myrtle Creek	14%	3.5%
Myrtle Park	16%	5.7%
Red Hill	12%	4.1%
Sage Hen Creek	12%	3.9%
Stancliffe Creek	14%	3.5%

Aspen Stand with Conifer Encroachment

Soils

Topography

The Silvies Canyon project area generally has a south aspect. The topography varies from flats (generally dry, moist, or wet meadows) to slopes of varied steepness. Elevations range from 5,000 to 6,400 ft above sea level.

Soil Types

The best soil description and map available is the Soil Resources Inventory (SRI) (Carlson 1974). Information about soil types from the SRI forms the basis for the following discussion. However, this map and report was made for large-area planning. A sample of field observations and aerial photos indicates the SRI map is generally correct, but not in all cases. For instance field observations in the project area, by the Blue Mountain District soils specialist, documented one areas mapped as non-forest or marginal forest soil that is are, in fact, forested.

Generally, the accuracy of the SRI for determining soil texture, or whether a site supports forest or non-forest is probably 80% or more accurate. For determining suitability for subsoiling, the SRI may only be 60% accurate because there is a lot of site-specific variability that is not captured in the broad landtypes in the SRI. For determining slope (and thus erodibility), the SRI is probably 80% or more accurate for soils mapped as less than 30% slope, but only 50% accurate for soils mapped as steeper than 30%. The Silvies Canyon project area may be more accurate, because of its canyon/plateau topography. These estimates of the accuracy of the SRI are based on several years experience of using the Malheur National Forest SRI by the Blue Mountain District soils specialist.

The SRI gives a broad overview of the soils and their hazards, limitations, and productivity potentials. A complete list of soils that occur in the project area is in the analysis file. The following is a general characterization of the soils, including a description of their occurrence on the landscape, some key soil properties, capabilities, qualities, and hazards. Landtypes marked with * are the most extensive within the group and within the Silvies Canyon Project area.

Valley Floor and Meadow Soils

The soils in this group are mostly deep and moderately deep, silty to clayey, moderately well to poorly drained and are on gentle (less than 15%) slopes. They are forming in valley fill materials. Water holding capacity is about 20 to 25 inches. These soils have a high hazard for compaction and are highly susceptible to gully and streambank erosion. These soils are not extensive, but are highly productive and support a dense cover of grasses and sedges. (Landtypes 1 and 3).

Soils with Sage Plant Communities Dominant

Soils in this group are mostly very shallow and are very gravelly and cobbly loams. These soils have more than 40% surface stones and are excessively drained. Plant-available water holding capacity is less than one inch. These soils are on upland flats and gentle slopes of less than 30%, and are dominantly on rhyolite, basalt and andesite bedrock. These soils are not extensive and are largely in the southern part of the project area. They support discontinuous cover of low sage, stiff sage and grasses. Soil compaction, displacement, and erosion hazards are mostly low, but are moderate in some locations. (Landtypes 47 and 77).

Soils with Juniper Plant Communities Dominant

Soils in this group are mostly shallow and very shallow, are very to extremely gravelly loams and some clay loams, with more than 35% surface stones. They are well to excessively drained on upland flats nearly zero to more than 70% southerly slopes. Rhyolite is the dominant bedrock, but a few areas are underlain by basalt, tuff and breccia. These soils support mostly juniper plant communities with significant components of mahogany and bitterbrush, with a few scattered ponderosa pine. Surface erosion hazard is mostly moderate to high. Compaction hazard is mostly low, but is high in some areas. Soil displacement hazard is mostly moderate. Plant-available water holding capacity is generally less than two inches. (Landtypes 7*, 44, 46, 73, 74* and 85*)

Soils with Ponderosa Pine Communities Dominant

This group of soils is the most extensive in the project area. They are shallow and moderately deep, with loam and clay loam surface layers and clay loam and clay subsoils. They are mostly very gravelly and cobbly and usually have less than 20% stones on the surface, but there are inclusions of very stony and rocky, non-forested, areas referred to as "scabs." Most of the soils are well drained, but a few areas are somewhat poorly to poorly drained. The bedrock is mostly rhyolite and altered tuff and breccia, with small areas of basalt and andesite. These soils are mostly on upland flats and gentle slopes (0 to 30 %) with a southerly exposure, and on slopes of 30 to 70 % adjacent to the major drainage systems. Surface erosion hazard is low to moderate, except on slopes steeper than 45%, where it is high. When runoff does occur, the potential for downstream turbidity is relatively high. Compaction hazard is quite variable in this extensive group. There are significant areas that have a low compaction hazard, but significant areas of high hazard also are present. Soil puddling (loss of structure by shearing forces) is a hazard when these soils are wet. These soils generally have high strength when dry. Displacement hazard is mostly low to moderate. Plant-available water holding capacity is mostly less than three inches and productivity potential is relatively low. Some of the soils have moderate productivity potential. There are inclusions of moderately deep and deep alluvial soils in draws, toe slopes and along streams. (Landtypes 8*, 41*, 43, 68, 71* and 81*).

Soils with Mixed Conifer Plant Communities Dominant

These soils typically have an 8 to 15" surface layer of volcanic ash over a gravelly clay loam subsoil and are moderately deep or deep. Some have clay subsoils. The surface layers have low bulk density and relatively high infiltration rates. The soils are mostly on gentle to moderate slopes (0 to 50%), with some steep slopes along the major stream systems. While the general aspect is variable, northerly exposures are common. These soils are underlain by rhyolite, basalt, andesite and tuff. These soils have the highest waterholding capacities in the project area, 12 to 25", and they retain significant amounts of moisture throughout most of the summer. Plant-available water holding capacity is about 6 to 8" in some of these soils. The soils have a relatively thick litter layer, but are susceptible to displacement and dustiness when disturbed. Surface erosion hazard is mostly moderate to high and very high. The volcanic ash soils are susceptible to hydrophobicity (water repellency) when burn intensities are moderate to severe. These are the most productive soils in the project area. (Landtypes 9*, 42*, 48, 58, 65*, 75*, 82 and 83).

Existing Soil Conditions

An assessment of current soil condition classes was conducted on 274 units in the project area. All of the units were sampled between September 27 and November 14, 2002. The Blue Mountain District soils specialist trained technicians to collect data on existing condition. Technicians inspected almost all stands proposed for commercial harvest (about 580 acres were

inadvertently missed) to see if detrimental impacts were clearly less than 10%. On most areas that had been logged in the last 30 years, and on areas that may have 10% or more detrimental impacts (excluding roads and landings), quantitative data was taken on transects, using the protocol in Appendix E. All of the data forms were analyzed and interpreted by an experienced senior soil scientist.

Soil assessment replications were conducted, in a few stands, by the Blue Mountain District soils specialist to determine the accuracy of the assessments. All estimates made by trained technicians were higher than estimates by the Blue Mountain District soils specialist. Additionally, several stands were assessed two or more times by different technicians. This also confirms accuracy of assessments. Four soil condition classes were defined for the field sampling. The soil condition classes are as follows:

- Class 0—Undisturbed natural state
- Class 1—Low soil disturbance
- Class 2—Moderate disturbance
- Class 3—High disturbance

Classes 2 and 3 are considered to be detrimental conditions that may measurably affect soil quality, especially productivity and hydrologic function. The detrimental conditions may be due to soil compaction, displacement, puddling or rutting, erosion, and severe burns. Standards for these conditions are described in FSM 2520, R-6 Supplement No. 2500.98-1.

Past management practices have affected the current soil conditions. Decades of fire suppression have resulted in a dense cover of vegetation on some of the soils. On these sites, the long-term carrying capacity is exceeded because of the inability of the soils to supply adequate soil moisture and nutrients for sustaining healthy forest communities and vigorous tree and other vegetative growth. Many of the soils have been impacted by livestock and other hoofed animals, so that soil structure has been altered. Also, microbiotic crusts, important for erosion protection and nutrient supply on some soils in the sage and juniper communities, may have been broken or destroyed. Soils in most of the forested units have had one or more prior entries for timber harvest and skid trails remain visible. Soil compaction and displacement by equipment occurs to varying degrees. Soil erosion has and continues to occur on some sites, especially where roads aren't adequately maintained and skid trails are on steep slopes. Several stands (about 4.5%) have deep ruts in the skid trails. These are potential sources of chronic erosion. The stands with notable ruts are 6.01, 6.27, 10.07, 11.01, 11.08, 11.09, 11.11, 11.12, 12.01, 12.02, 21.05, 21.06, 23.06, 23.07, 26.06, 27.04, 30.05, 31.01, and 38.01 (also see Appendix E).

On the forested soils, the increased stand densities and the relative increase of Douglas-fir and white fir in both ponderosa pine and mixed conifer stands have resulted in thicker litter layers than occurred historically. This leads to more of the fine tree roots occupying the near surface layers of soil (Harvey et al. 1999). Soil nutrients become more concentrated at or near the surface under these conditions. When moderate and severe fires occur, there is a likelihood of greater consumption of organic materials and loss of nutrients through volatilization or runoff, and fine root mortality. Thus, there is a potential for loss of nutrients at an increased rate over background or long-term rates.

About one percent of the stands have detrimental soil compaction, displacement, or erosion in excess of the Forest and Regional Soil Quality Standards, according to the sample estimates. That is, more than 20% of the area within those units is damaged to a degree that productivity is likely affected and/or soil hydrologic functions are degraded. The stands currently exceeding soil quality standards on more than 20% of the area are 11.08, 11.09, 31.04 and 32.02. A cumulative total of approximately 3.4% of the stands have 15% or more of their area in detrimental conditions according to the sample estimates. The stands are 18.01, 24.09, 33.02, 33.16, 26.06, 27.14, 27.15 and 30.03, in addition to the stands previously identified as exceeding 20% of the area. There is a cumulative total of about 10% of the stands that have 10% or more of their area in detrimental conditions. The greatest amount of detrimental conditions is compacted and/or displaced soil. About 90% of the stands have less than 10% of their area in detrimental conditions.

Soil displacement and evidence of burning were recorded together in a few stands. This was usually noted where machine piling of slash had occurred. Examples of this are stands 33.05, 31.07 and 30.3. Underburning was recorded as "less than 20% detrimental," in stands 6.03, 6.09, 6.10 and 6.12.

Visible evidence of skid trails, roads, landings, or burn areas was observed by field sampling in most of the stands. Also, it was noted that in many stands skid trails exhibit low impact and little or no off-trail disturbance. Sites that have been occupied by hunter camps and the associated vehicle tracks were observed in a few units.

Roads and landings average approximately 2% of the area on the units that have had prior entries. The amount of roads and landings are variable and the sample estimates range from none to approximately 10% of a unit.

In most stands, the samplers indicated that existing skid trails and landings could be used again as needed. In some cases, it was noted that there were few trees, or trees were small, in trails after 30 years. Examples of this are in stands 18.04 and 30.01. In some units, accumulations of down woody debris and scattered slash were observed. In general, the field sampling appears to confirm that the soils are generally stony, and relatively shallow where juniper and scattered pine occur. Where mixed conifer and more dense stands of pine occur, the soils generally are observed to be moderately deep or deep. But field observations also note that these soils are often stony or have rock exposures on the surface. For more site-specific information on soils refer to Appendix E.

Vegetation

The vegetation patterns in the Silvies Canyon project area vary from forested stands of ponderosa pine, Douglas-fir, white fir, lodgepole pine, western larch, aspen, and juniper to non-forested areas of grass, forbs, brush, and scattered ponderosa pine and/or juniper. Principal human activities that have altered the natural succession of the project area include fire suppression, grazing, timber harvesting, fuels management, and road construction.

Potential Vegetation Groups

Specific plant species tend to be found together in a characteristic set of ecological conditions. The unit of classification based on the probable, or projected, climax plant community type is

defined as the "plant association" (USFS R-6 Ecology Glossary committee, 1989) and may be used to describe and classify sets of ecological conditions. For purposes of classification and analysis, plant associations may be grouped into areas with like temperature/moisture and fire disturbance regimes called Potential Vegetation Groups (PVG) (Interior Columbia Basin Supplemental Draft Environmental Impact Statement, 2000). Within the project area there is one Forested PVG (Dry Upland), two Woodland (Dry and Moist) PVGs, and numerous Shrublands, Herblands, Riparian Forests, Riparian Shrublands, and Riparian Herblands PVGs (Blue Mountain National Forests Forest Planning Decision Document dated July 18, 2002, file code 1920; *Establishment of a potential vegetation hierarchy for forest planning*). Only the Forested PVG will be analyzed for HRV (Historical Range of Variability), which is required by Regional Foresters Amendment # 1 and #2. For the purposes of analysis, the Woodlands, Shrublands, Herblands, Riparian Shrubland and Riparian Herblands will all be grouped together and categorized as Non-forest. A small part of the Riparian Forest (Aspen Stands and Cottonwood) maybe included in the Forested PVG.

Dry Upland Forest PVG

The Dry Upland Forest PVG has been further subdivided into Hot Dry, Hot Moist, and Warm Dry Plant Association Groups (PAG). There is no Hot Moist PAG in Silvies Canyon Watershed. Both the Hot Dry and the Warm Dry PAGs are very moisture-limited environments. Historically the predominant forest species was ponderosa pine, and stands were typically open and of variable stocking and structure (see Table 3-7).

Table 3-7. **Historic Stocking Levels (Munger 1917; Erickson and Conover 1918).**

DBH	Typical Trees/Acre	Range
1-10	22-38	2-44
10-20	17-23	2-23
20+	7-17	4-17

The fire regime in most of the forested area in this project area from 1752 to 1890 was approximately 15.3 years with a range of 5 to 23 years (Maruoka and Agee, 1994). When forest fires occurred they would creep into the other PVGs in a mosaic fashion before going out. Mortality from fire was light and patchy, and rarely was the whole stand killed (Munger, 1917).

In these forested stands there are a variety of understory shrubs, forbs and grasses that grow in conjunction with trees. With increased stocking of trees there has been a decrease in the stocking of shrubs, forbs, and grasses in these stands, and also a decrease in the plant species diversity with a corresponding change in the wildlife species that used the area. With the invasion of trees into nonforested areas there has been a decrease in the total number and the diversity of plant species that inhabited the former nonforested site. Finally with increased diversity and stocking of trees (stands that were once dominated by ponderosa pine that have now converted to mixed conifer) there has been a decreased diversity and total number of plants in these stands.

Hot Dry PAG

This PAG covers approximately 6,508 acres (10%), primarily in the southern 1/3 of the project area. Historically, trees typically grew in clumps of 2 to 10 trees, surrounded by single trees unevenly spaced at 80 to 300 feet. Tree density was low, resulting in open stands and good tree vigor. Mortality from fires was light and patchy. Natural reforestation of small patches was

infrequent. Seed usually came from nearby trees, since large seeds do not disperse widely with the wind. Survival of the seedlings was low because of the frequent fires, which usually killed most of the seedlings.

This PAG is now composed of three types of stands: 1) ponderosa pine and juniper, 2) predominantly even aged ponderosa pine stands, and 3) two storied stands. The predominant tree species in this group is ponderosa pine with smaller amounts of juniper. Occasionally Douglas-fir may grow in some stands but these are small inclusions of the Warm Dry PAG. This PAG is commonly intermixed with the Non-forested PVGs.

The stands composed of ponderosa pine and juniper generally represent invasions of these species into non-forested areas, or the most moisture limited sites. Juniper is now very common throughout the project area, including riparian areas. The even aged ponderosa pine stands appear to be second growth plantations, but most are a result of ponderosa pine invading non-forested areas or areas that were open savannahs with 2 to 5 trees per acre.

The two storied stands are usually composed of scattered large over-story ponderosa pine with a second story of ponderosa pine that have come in since the advent of grazing and fire suppression. These stands were historically uneven age forested stands but past timber harvests have removed most of the large trees leaving scattered smaller trees that have now grown. This opened up growing space for regeneration and converted the stands to two-storied stands. Historically in this PAG the average number of large (over 21" DBH) trees varied from 0 to 9 trees per acre.

Most of the stands in this PAG are heavily overstocked and growth has declined in recent years making them susceptible to mountain pine beetle and western pine beetle. There are scattered pockets of annosus and black stain root disease.

The historic snag (>12" dbh and 16' height) level was 0.85 per acre (Schwenke, 2003; Erickson and Conover, 1918). A breakdown in snag size is shown in Table 3-8.

Table 3-8. **Historic Snag Levels per acre for Ponderosa Pine Plant Associations.**

Snag Size (dbh)	Average Snags per Acre	Range of Snags per Acre
12-20"	.35	0-.43
21-30"	.47	.34-1
30"+	.03	0-.11

Warm Dry PAG

This PAG covers approximately 43,527 acres (67%), primarily in the northern 2/3 of the project area. Although ponderosa pine historically was the dominant tree species in this potential vegetation group, in most of the plant associations Douglas-fir or white fir is the climax species. Dominance of ponderosa pine was maintained by periodic fire. Ponderosa pine trees typically grew in clumps of 2 to 10 trees, surrounded by trees evenly spaced at approximately 80 to 100 feet. Tree density was low, resulting in open stands with good tree vigor. Natural reforestation of small patches in openings created when one to two trees were killed was good but infrequent (30 year intervals with a normal range of 10 to 50 years). Seed usually came from nearby trees. Seedling survival was low because of frequent fires that killed most of the seedlings. Historically the average number of large (over 21" DBH) trees per acre would have varied from 9 to 17.

In the stands of the northern 1/3 of the project area, western larch probably occurred quite frequently as did stands of pure lodgepole pine and stands in which lodgepole grew in conjunction with ponderosa pine and western larch. White fir and Douglas-fir occurred throughout the northern 2/3 of the project area but were generally maintained by fire on the cooler northern and eastern aspects.

With the advent of fire suppression, and past timber harvesting practices, the composition of these stands has radically changed and moved towards the climax species. The stocking has increased two to four fold (basal area) and up to 10 times (trees per acre). The subsequent changes in continuity, arrangement and loading of fuels have resulted in a changed fire regime. With the increased density and shading the composition and abundance of shrubs, forbs, and grasses have decreased.

Stands in the middle 1/3 of the project area are composed of: 1) ponderosa pine, or 2) mixed conifer (Douglas-fir and ponderosa pine with a minor amount of white fir). Most of these stands have a scattered component of large ponderosa pine. The ponderosa pine stands are overstocked and highly susceptible to mountain pine beetle and western pine beetle. The mixed conifer stands are multistoried and all-aged. The white fir and Douglas-fir are highly susceptible to Douglas-fir tussock moth, spruce budworm, dwarf mistletoe and annosus root disease. The Douglas-fir is also susceptible to Douglas-fir bark beetle, and the white fir to fir engraver and Indian paint fungus. Clumps or stringer stands of aspen have begun to appear in the riparian areas.

The northern 1/3 of the project area consists of stands of: 1) ponderosa pine, 2) mixed conifer, and 3) lodgepole. Many stands of ponderosa pine or mixed conifers have a scattered component of large ponderosa pine and numerous understories. Ponderosa pine stands are overstocked and highly susceptible to mountain pine beetle and western pine beetle. Mixed conifer stands are multistoried and all-aged and include ponderosa pine, Douglas-fir, white fir, lodgepole pine, and western larch. White fir and Douglas-fir in these stands are highly susceptible to Douglas-fir tussock moth, spruce budworm, dwarf mistletoe, and Annosus root disease. Douglas-fir is also susceptible to Douglas-fir bark beetle, and white fir to fir engraver and Indian paint fungus. Lodgepole stands have probably increased due to harvesting of the large ponderosa pine, especially in cold pockets. The lodgepole pines are large enough that they are now susceptible to mountain pine beetle. Western larch is found in only a few locations and has decreased in frequency. Aspen occurs as stringer stands in riparian areas but has decreased in frequency. Juniper is less common in the northern 1/3 of the project area.

Aspen was once quite common throughout the northern 2/3 of this project area and occurred generally in the riparian areas as uneven age stringer stands. Cadastral surveys conducted in the mid-1800s recorded "jungles of aspen" in some meadows on the Malheur National Forest. Today, most aspen stands found within the project area are small and occur as a few old decadent stems with little or no viable regeneration. This has occurred because they are being overgrown by conifers, disturbances that could regenerate the clones are lacking; ungulates browse the few new sprouts that do occur, and stream downcutting has lowered water tables. Without protection from ungulates, aspen sprouts often are prevented from maturing by browsing.

Historically most aspen stands were fire resistant due to the higher moisture of the "riparian" vegetation often associated with aspen. When periodic fires occurred they would burn up to the edge of aspen stands in a mosaic fashion and kill a few trees, seldom burning through the whole

stand. Where the few trees were killed regeneration would occur in dense clumps. This regenerated the stand in uneven age phases or groups of trees. With effective suppression of natural fire, beginning in the early 1900's the older structure of these stands have died off and were replaced by conifers. The present aspen stands are the remnants of these much larger stands and are composed of the regeneration that was present when fire suppression began.

In most cases, succession to conifers has led to diminished patch size, loss of vertical structural diversity, and loss of this species from most riparian corridors. The lack of stand regeneration has resulted in a decline of aspen acreage in the project area and the competitive capabilities of aspen to regenerate and maintain vigor. Aspen can produce viable seed but usually regenerate vegetatively through root suckers (adventitious shoots that sprout from the shallow lateral roots of the parent tree if apical dominance does not inhibit suckering). This process is accelerated when the parent tree is stressed or killed. The result is a clump (clone) of trees identical in genetic composition, which can cover many acres under the right conditions. Although the physiological age of individual mature trees varies from 60 to 120+ years, the clone itself may be hundred or thousands of years old. Research suggests that some clones in the Great Basin are at least 8,000 years old.

Disturbances such as prescribed fire and vegetation treatments, as well as protection from browsing are necessary to perpetuate aspen. Where aspen stands have been treated, either with fire (natural or prescribed) or by removal of overstory vegetation, and protected to exclude or restrict browsing, regeneration has been successful and vigorous.

The present source of most of the perennial water sources in this area originates in our present aspen stands. This could be due to there being more moisture available and aspen being able to out compete conifers at these sites. Aspen roots also alter the ground water holding capacity by creating a "fibrous sponge" that is more effective in holding soil moisture during early spring and slowly releasing the moisture over a longer period of time through the summer period.

Most of our present known aspen stands were inventoried in either 1998 or 1999. These stands ranged in size from single trees, to up to 40 acres in size. Approximately 50% of the stands were less than an acre in size and about 30% of the stands were ½ acre or less in size. Within these stands the large conifer (over 21" dbh) ratio to large aspen (over 12" dbh) is 3 to 1. In the mid summer of 2002, approximately 20 stands were revisited. Approximately 10% of the smallest stands inventoried in 1998 and 1999 could not be located.

The historic snag (12" dbh and 16' height) level in this PAG varied widely based on presence of lodgepole pine in the stands (Schwenke, 2003; Erickson and Conover, 1918). These differences are shown in Table 3-9.

Table 3-9. **Historic Snag Level per acre for Mixed Conifer Plant Associations with and without Lodgepole Pine.**

Snag Size (dbh)	Average Snags per Acre in Stands With Lodgepole Pine	Average Snags per Acre in Stands Without Lodgepole Pine
12-20"	1.42	.19
21-30"	.33	.30
30"+	.09	.07

Non-Forest PVG

Non-forest potential vegetation groups cover about 15,201 acres (23%) of the project area. Non-forested potential vegetation groups include woodlands, aspen, shrublands, grasslands, wet, moist and dry meadows PVGs, and other non-vegetated lands. Non-forested PVG sites are composed of plant associations in which trees are generally absent. Vegetation on these sites historically was dominated by a variety of perennial grasses, forbs, and shrubs. Due to past grazing practices, the exclusion of fire, and the invasion of introduced species there has been an increase in annual species and a decrease in perennial species.

The natural fire regime is one of frequent (5-23) low intensity fires except for the scab flats and rocky ridges where large old growth juniper was predominantly located. Most historical perennial species were adapted to these fire regimes. Some introduced annual species such as cheatgrass are also well adapted to fires. Depending upon the frequency and timing of burning these species could either be favored or selected against.

Starting approximately 130 years ago there has been a dramatic decrease in riparian shrub species (such as alder, willow, dogwood, and maple) due to increased browsing by ungulates and competition from conifers. These changes in vegetation, along with increased trampling of banks, and changes in hydrological conditions due to roads have changed the stream structure, resulted in downcutting, which has lowered the water table in many areas. This has caused a further decrease in other riparian vegetation such as forbs and shrubs, and a decrease in the width of the riparian vegetation along the streams in this area.

Woodlands PVG

Most of the woodlands PVG are juniper climax plant associations that were historically dominated by a low stocking of either juniper or scattered ponderosa pine with grasses, forbs, and shrubs. The trees in these plant associations were kept at a low stocking in this early seral stage by frequent low intensity fires. Juniper was more prominent on scab flats and rocky ridges where there was not enough vegetation to support fires. With the advent of fire control and grazing, stocking of tree species has increased on these sites and areas that were formerly non-forested have been converted to woodlands (Skovlin and Thomas, 1995). With the increase in juniper there is usually a decrease in other vegetation and an increase in fire interval. Prior to the effective control of fire, juniper stands in the project area were dominated by seedlings and saplings stages with very few pole and larger sizes, except for isolated or small pockets of mature trees. The mature juniper trees were generally confined to areas not prone to frequent fire, such as rock-dominated areas. Once established, juniper will utilize a majority of the available soil moisture which causes shrubs to decline, converts shrubland to pure juniper stands, and leaves bare ground that is susceptible to erosion and weed invasion (Loewen and Schwenke, 2003).

Moist Upland and Dry Upland Shrubland PVGs

Moist upland and dry upland shrublands cover about 15% of the project area. Representative shrub species of these PVGs include mountain big sagebrush, low sagebrush, stiff sagebrush, rabbitbrush, bitterbrush, and mountain mahogany. Representative grass species include the native grasses bluebunch wheatgrass, Idaho fescue, bottlebrush squirreltail, Sandberg's bluegrass and prairie junegrass; and seeded domestic grasses such as orchard grass. These associations are usually found on well-drained and dry soils. This group provides the bulk of the non-forest rangeland forage for ungulates.

About 176 acres of these shrublands are classified as mountain mahogany dominated stands. These small, dispersed stands of mountain mahogany can be found on open slopes, especially along rocky dry ridges and poor soil sites in portions of the project area. It also occurs on dryer south aspect dry pine and mixed conifer stands.

Mountain mahogany found during fieldwork showed sign of prolonged heavy utilization and were hedged, highlined, or declining in health. With effective fire suppression, conifers have invaded these patches of mahogany and are competing for growing space, water, and nutrients. Mountain mahogany is decadent and declining, and little natural regeneration was observed.

Dry Upland Herbland PVG

Dry upland herblands cover about 1% of the project area. Herblands occur as small meadows throughout the forested plant associations of the project area. They occupy drier, shallow soil areas and frost pockets. Representative grass species are bluebunch wheatgrass, Sandberg's bluegrass and Idaho fescue.

Riparian Herbland PVG

Riparian herblands cover about 3% of the project area. Representative shrub species of these PVGs include willows, alders, currants, common snowberry, and red-osier dogwood. Sedges and rushes are the dominant graminoids in these PVGs. Kentucky bluegrass and common timothy were planted (prior to 1970s) as forage species in meadow-like areas. These species are also abundant on sites where disturbances have degraded the native vegetation thus allowing Kentucky bluegrass and common timothy to maintain composition or increase.

Current Conditions

Past management practices that have affected the current condition of vegetation within the project area are fire suppression, grazing, timber harvesting, fuel management, and road construction. Historically the project area was maintained by periodic, low intensity fire, caused either by lightning or by American Indians. With the advent of European descendent settlers (1860s to 1900s) grazing of sheep and cattle began along with fire control. With the lack of fire, Douglas-fir and white fir began invading areas dominated by ponderosa pine, and ponderosa pine and juniper began invading areas that were formerly non-forested. This has changed the large open pine stands and grasslands to stands with dense understories, brush, and encroaching fir and juniper. These conditions have created higher fuel loading and more ladder fuels, increasing the risk of high severity wildfires to 68% and moderate severity wildfires to 21%, while reducing the low severity wildfires to 11% (Johnson 1998).

Stand Structure

PONDEROSA PINE

Large ponderosa pine has decreased in percent stand composition throughout the project area. This is generally due to past harvesting of the large pines and lack of treatment of the understory. The existing large pines often have a dense understory competing with them for water, the limiting factor in this ecosystem. This has caused decreased growth and increased stress on the large trees. This stress on the large trees has allowed them to become susceptible to drought and pests such as western pine beetle. Increased stocking levels have increased the potential fuel and changed the type and intensity of fire that occur in this forest type.

MIXED CONIFER

In the mixed conifer stands there is a much higher component of white fir and Douglas-fir than was present historically. The white fir and Douglas-fir have greatly increased in percent composition while ponderosa pine has decreased drastically. This is due to past harvesting of the large ponderosa pine and fire control which allowed the more shade-tolerant Douglas-fir and white fir to survive and flourish in the understory. This understory in most areas is generally unmanageable due to stunting and unacceptable growth rates. Most of the white fir has been inoculated with Indian paint fungus. Dwarf mistletoe in Douglas-fir is widely spread in most of the project area. The increased stocking of species that have a greater amount of foliage has increased the fuel and changed the type and intensity of fire that now occurs in this forest type.

WESTERN LARCH

Western larch occurs in patches throughout the northern 1/3 of the project area. Only a few large (greater than 21" dbh) trees were noted during field reconnaissance although numerous large stumps were noted. Western larch appears to have decreased in frequency due to past harvesting and lack of burning.

Non-forest Vegetation

Non-forested vegetation within the project area is dominated by a variety of perennial grasses, forbs, and shrubs. Non-forest vegetation includes juniper, grass, aspen, meadow vegetation, sagebrush, mountain mahogany and riparian shrubs. The composition is the result of interactions among several factors: soil type, soil moisture, aspect, tree canopy cover, big game use, historical livestock use, forest management activity, and the presence or absence of fire in the ecosystem. Many of these factors have enabled conifer encroachment and conversion of meadows, riparian areas, and rangelands into forested lands. Due to these factors, there has been an increase in annual species and a decrease in perennial species.

ASPEN

There are approximately 268 acres of located aspen stands in Silvies Canyon, with an estimated total acreage (inventoried and uninventoried) of 400 acres. Aspen occurs in riparian areas as stringer stands, and has generally declined due to competition and lack of periodic disturbance. These stands were once more extensive which may be observed from the numbers of remnant snags and downed aspen logs. Stands are generally late to old structure with very few stands having a young component. This is mainly due to browsing of regeneration by ungulates. The water table in these stands may have also been altered due to harvesting of beaver in the past, disruption of the water flow due to construction of roads and ponds, and the greater intake of water by upland plants such as the increased stocking of conifers. Mortality rate of large aspen in these stands is estimated at 31%.

COTTONWOOD

Not much is known about the historical occurrence of cottonwood in this project area or the Emigrant Creek Ranger District. It is surmised from looking at the distribution of the known sites, and the frequency that maps refer to cottonwood, that it once was more common. There are two known sites where cottonwood exists in the project area, Sage Hen Creek and along Forest Road 3100. The Sage Hen site has approximately a dozen large decadent and declining cottonwood trees. The Forest Road 3100 site is a lone young cottonwood that is growing in the

road fill. Throughout the whole Emigrant Creek District, cottonwood is very rare, generally decadent, seldom reproducing, and susceptible to disease, pests and wind.

JUNIPER

Juniper has been an invading species for the last 120 years throughout the project area. Effective fire control and grazing have allowed this species to increase. Juniper is now very common throughout the project area, including riparian areas, shrub lands and forested lands where it did not previously occur.

Natural Fuels

Large amounts of fuels have built up in some areas due to years of effective fire suppression, insect and disease outbreaks, and localized storm events. Fuel conditions in this area are becoming increasingly hazardous. Increased tree densities, subsequent increased fuel loading, and increased fuel continuity across the landscape have also contributed to this hazard. These conditions result in larger and more severe wildfires, especially within ecosystems in which frequent fire has been excluded. The 1995 Federal Wildland Fire Management Policy and Program Review (signed by the secretaries of Agriculture and Interior) attempts to address the fire hazard situation nationally. This policy directs federal wildland fire agencies to achieve a balance between fire suppression and fuels management to sustain healthy ecosystems (Beighley et al. 1999). The potential for large fires on the district is the result of several factors:

- Effective fire suppression and lack of prescribed fire has resulted in increased fuel loading, increased fuel laddering and modified fuel composition and density.
- Slash created by past timber harvesting activities was not adequately disposed of.
- Timber stand composition and structure has changed due to past harvest activities and the exclusion of fire. White fir and Douglas-fir have encroached into stands that were historically dominated by ponderosa pine. Juniper has increased due to the suppression of fires.
- Most stands are overstocked when compared with site capabilities. Increased competition for water, the limiting resource in this ecosystem, results in stressed trees reduced growth and increased mortality from insects and disease.
- In recent years, drought has lowered the moisture content of the litter and slash layer and caused the standing green trees to cast off more needles. This results in a deeper litter layer, resulting in flashy fuels.

Currently many of the stands are a Fire Behavior Fuel Model 10 or 11. These models are illustrated in *Photo Series Quantifying Natural Forest Residues in the Ponderosa Pine Type, Ponderosa Pine and Associated Species Type, and Lodgepole Pine Type, USDA Forest Service General Technical Report, PNW-52, 1976*. Fire Behavior Fuel Model 10 is a litter model and Fire Behavior Fuel Model 11 is a slash model. These fuel models represent fuel loading that is heavier than historical conditions. These heavy fuel loadings create fire control difficulties. Both of these fuel models have a higher fire intensity level than historic or desired and large stand-replacement wildfires will eventually occur. Table 3-10 discusses the amount of fuel currently within the fuel blocks.

Table 3-10. **Current condition of natural fuels within fuel blocks.**

Fuel Block and Total Acres	Vegetation Types	Photo Series[1]	Fuel Model[2]	Tons per Acre[3]	Fuel Bed Depth (inches)[3]
Fuel Block 1 2,484 ac	Mixed Conifer (99%)	PMS-830 pg 17	10	17.1	1.6
	Juniper/Non-Forest (1%)	PNW-105 pg 228	2	.24	.1
Fuel Block 2 5,298 ac	Mixed Conifer (89%)	PNW-105 pg 101	9	11.1	1.0
	Ponderosa Pine (8%)	PNW-105 pg 183	9	8.3	1.6
	Juniper/Non-Forest (3%)	PNW-105 pg 223	2	.24	.1
Fuel Block 3 5,023 ac	Mixed Conifer (69%)	PMS-830 pg 15	9	9.7	1.3
	Juniper/Non-Forest (22%)	PNW-105 pg 223	6	1.4	.3
	Ponderosa Pine (9%)	PNW-105 pg 183	9	8.3	1.6
Fuel Block 4 2,100 ac	Mixed Conifer (88%)	PMS-830 pg 19	10	18.6	1.9
	Juniper/Non-Forest (9%)	PNW-105 pg 223	6	1.4	.3
	Ponderosa Pine (3%)	PNW-105 pg 171	9	8.5	1.2
Fuel Block 5 7,798 ac	Mixed Conifer (67%)	PMS-830 pg 15	9	9.7	1.3
	Juniper/Non-Forest (19%)	PMS-830 pg 51	6	2.9	0
	Ponderosa Pine (14%)	PNW-105 pg 183	9	8.3	1.6
Fuel Block 6 5,526 ac	Juniper/Non-Forest (39%)	PMS-830 pg 55	6	.1	0
	Mixed Conifer (35%)	PMS-830 pg 15	9	9.7	1.3
	Ponderosa Pine (26%)	PNW-105 pg 181	9	6.4	3.2
Fuel Block 7 3,988 ac	Ponderosa Pine (47%)	PNW-105 pg 183	9	8.3	1.6
	Mixed Conifer (31%)	PNW-105 pg 52	10	23.7	2.3
	Juniper/Non-Forest (22%)	PMS-830 pg 53	6	.8	0
Fuel Block 8 940 ac	Juniper/Non-Forest (57%)	PMS-830 pg 53	6	.8	0
	Ponderosa Pine (22%)	PNW-105 pg 183	9	8.3	1.6
	Mixed Conifer (21%)	PMS-830 pg 15	9	9.7	1.3
Fuel Block 9 895 ac	Ponderosa Pine (38%)	PNW-105 pg 183	9	8.3	1.6
	Juniper/Non-Forest (35%)	PMS-830 pg 53	6	.8	0
	Mixed Conifer (27%)	PNW-105 pg 25	10	23.7	2.1
Fuel Block 10 3,419 ac	Mixed Conifer (96%)	PMS-830 pg 17	10	17.1	1.6
	Juniper/Non-Forest (4%)	PNW-105 pg 228	2	.24	.1
Fuel Block 11 696 ac	Mixed Conifer (91%)	PMS-830 pg 17	10	17.1	1.6
	Juniper/Non-Forest (7%)	PMS-830 pg 51	6	2.9	0
	Ponderosa Pine (2%)	PNW-105 pg 183	9	8.3	1.6
Fuel Block 12 1,110 ac	Ponderosa Pine (39%)	PNW-105 pg 183	9	8.3	1.6
	Mixed Conifer (36%)	PMS-830 pg 17	10	17.1	1.6
	Juniper/Non-Forest (25%)	PNW-105 pg 220	2	.9	.2

[1] This information is taken from Stereo Photo Series for Quantifying Natural Fuels (Ottmar et al) and Photo Series For Quantifying Natural Forest Residues in Common Vegetation Types of the Pacific Northwest (Maxwell et al).

[2] Fuel models were taken from the publication Aids to Determining Fuel Models For Estimating Fire Behavior (Anderson).

[3] Tons per Acre and Fuel Bed Depth data were taken from the photo series publications.

In the mid 1990s, a natural fuels program began on the Burns Ranger District. The 854-acre Joaquin Timber Sale Prescribed Burning Project was the first prescribed burning project initiated in and around the Silvies Canyon project area that prescribed burned areas (210 acres) outside of timber sale units. Silvies River Prescribed Burning Project followed by prescribed burning approximately 2,000 acres on a landscape scale. Silvies South Prescribed Burning Project proposed prescribed burning on approximately 4,355 acres. This project was completed in 2002.

Low Intensity, Prescribed Fire
Silvies South Prescribed Burning Project
Spring 1998

Summary

Regardless of the forest type, most stands are generally overstocked. Most of the area has been partially harvested at some time in the last 50 years. Much of this harvesting was in the form of salvaging, sanitation, and regeneration cutting or large tree removal. There is still an old growth component in some of these stands, but it is generally declining due to age and competition. Many of these stands are susceptible to disease and insects due to overstocking. Typical insect and disease problems in ponderosa pine stands are mountain pine beetle, western pine beetle, Annosus root disease, black stain root disease, and western dwarf mistletoe. Typical insect and disease problems in the mixed conifer stands are fir engraver, western spruce budworm, Douglas-fir tussock moth, Douglas-fir beetle, Douglas-fir dwarf mistletoe, Indian paint fungus, and Annosus root rot.

The Silvies Canyon project area was historically maintained by fire, either caused by lightning or set by American Indians. Due to past fire suppression policies and inadequate fuel treatments, large amounts of fuels have built up in some areas. Fire cannot now be easily restored to the ecosystem during the historical burning period without the high risk of a large wildfire occurring unless vegetation is pretreated to reduce fuel levels.

Stand Structural Stages – Historical Range Of Variability

The Historical Range of Variability (HRV) can serve to compare historical and current conditions. HRV is an indicator of ecological health, integrity, and sustainability. A key concept is that native species are adapted to and have evolved with the disturbance regime of an area. Ecosystem elements occurring within their historical range are believed to represent sustainable, resilient, productive, and healthy situations. After identifying historical ranges for a particular variable, the important ecological processes may be inferred for creating and sustaining those conditions. As such, HRV is particularly useful as a reference point or benchmark.

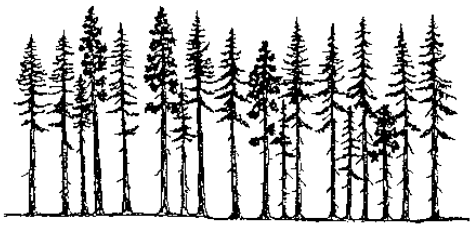
HRV can be used with a wide variety of ecosystem elements, although to date, the Forest Service has focused primarily on forest structural states. A stand can be assigned a point on a development pathway. Based upon this point, pathways of future development can be predicted. Every forest stand eventually passes through a series of structural stages, although not every stand

passes through all of the stages or spends an equal amount of time in any particular stage. The route a stand takes and the time it takes in passing through a stage often is dictated by the disturbances it is or isn't subjected to; these include both natural and human caused disturbances.

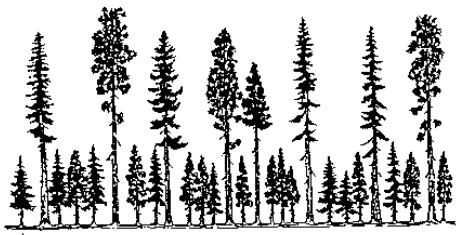
Stand structure was evaluated at the project area scale. The stands within the project area were visited and classified on the ground. Structural stage classifications are consistent with the Regional Forester's Amendment #2. Structural stages used for the HRV analysis include the following (see Figure 3-2):

1. **Stand Initiation (SI):** Growing space is in the process of being reoccupied following a stand-replacing disturbance, typically by seral species.
2. **Stem Exclusion Open Canopy (SEO):** Occurrence of new tree stems is excluded (moisture limited). Crowns are open grown. Canopy is discontinuous. This structure can be maintained by frequent under burning or thinning.
3. **Stem Exclusion Closed Canopy (SEC):** Occurrence of new tree stems is excluded (light or moisture limited). Crowns are closed and abrading.
4. **Understory Reinitiation (UR):** A second cohort of trees is established under an older, typically seral, overstory. Mortality in the overstory creates growing space for new trees in the understory. Large trees are uncommon.
5. **Young Forest Multi-Stratum (YFMS):** Several cohorts of trees are established. Large overstory trees are uncommon. Pole, small, and medium sized trees dominate.
6. **Old Forest Multi-Stratum (OFMS):** Several to many cohorts and strata of trees are present. Large trees are common.
7. **Old Forest Single-Stratum (OFSS):** A single stratum of large trees is present. Large trees are common. Young trees are absent or few in the understory. Park-like conditions may exist.

Stand Initiation (SI). Following a stand replacing disturbance such as wildfire or timber harvest, growing space is occupied rapidly by vegetation that either survives the disturbance or colonizes the area. Survivors literally survive the disturbance above ground, or initiate growth from their underground roots or from seeds stored on-site. Colonizers disperse seed into disturbed areas, the seed germinates, and then new seedlings establish and develop. A single canopy stratum of tree seedlings and saplings is present in this stage.



Stem Exclusion (SECC or SEOC). In this stage of development, growing space is occupied by vigorous, fast-growing trees that compete strongly for available light and moisture. Because trees are tall and reduce sunlight, understory plants (including smaller trees) are shaded and grow more slowly. Species that need sunlight usually die; shrubs and herbs may become dormant. In this stage, establishment of new trees is precluded by a lack of sunlight (**stem exclusion closed canopy**) or of moisture (**stem exclusion open canopy**).



Understory Reinitiation (UR). As a forest develops, new age classes of trees (cohorts) establish as the overstory trees die or are thinned and no longer fully occupy growing space. Regrowth of understory vegetation then occurs, and trees begin to develop in vertical layers (canopy stratification). This stage consists of a sparse to moderately dense overstory with small trees underneath.

Young Forest Multi Strata (YFMS). In this stage of forest development, three or more tree layers are present as a result of canopy differentiation or because new cohorts of trees got established. This stage consists of a broken or discontinuous overstory layer with a mix of tree sizes present (large trees are absent or scarce); it provides high vertical and horizontal diversity. This stage is also referred to as "multi-stratum, without large trees" (USDA Forest Service 1995).

Old Forest (OFSS or OFMS). This structural stage is marked by many age classes and vegetation layers and usually contains large-diameter trees. Standing and fallen dead trees may have resulted in a discontinuous overstory canopy. The illustration shows a single-layer, old-forest stand of ponderosa pine that evolved from low-intensity underburning (**old forest single stratum**). On cool moist sites without recurring underburns, multi-layer stands with large trees in the uppermost stratum may be present (**old forest multi strata**). These stages have also been referred to as "single stratum, with large trees" and "multi-stratum, with large trees" (USDA Forest Service 1995).

Sources/Notes: Based on Oliver and Larson (1996) and O'Hara and others (1996).

Figure 3-2. Descriptions of stand structural stages.

Historical range of variability was developed for large landscapes. The project area was characterized by patterns of live tree stand structure by PVG/PAG and compared to HRV. This HRV is shown both by percentages and acres. Although non-forested PVG areas are usually not included in an HRV analysis, for this analysis they have been included to show changes due to encroachment and conversion of non-forested areas to forested areas.

For comparison the Historic period is approximately 1860 to 1900. This period was selected because it corresponds with the approximate beginning of impacts of settlement by European settlers or their descendents and we have some knowledge of what the area was like based upon their recordings in the early part of the century.

Watershed HRV

Figures 3-3 and 3-4 display the differences between historic and current vegetation conditions at the watershed scale. Current conditions show a decrease in non-forested acres and a subsequent increase in the Dry Forest, Hot Dry plant association group that is found primarily in the southern 1/3 of the watershed. This data corresponds with recent observations of conifer encroachment and conversion of non-forested land into forested land.

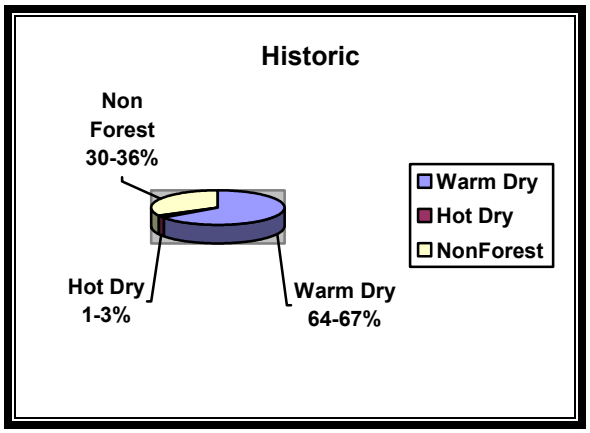


Figure 3-3. Silvies Canyon Watershed Historic Conditions.

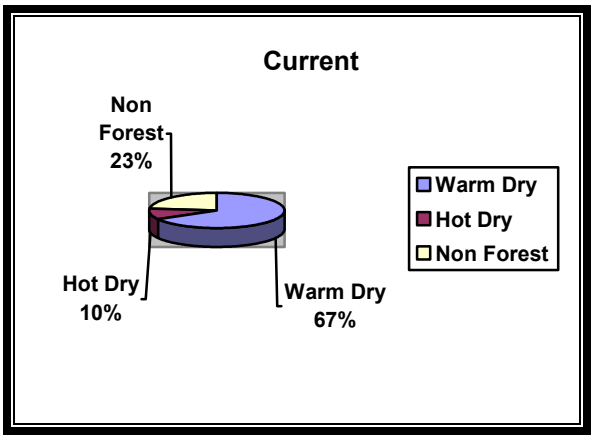


Figure 3-4. Silvies Canyon Watershed Current Conditions.

Figures 3-5 and 3-6 display the differences between historic and current Dry Forest, Hot Dry plant association group. Note the large decrease in stands where large trees are common (OFMS) and the increases in stands where large trees are uncommon (SEO, SEC and YFMS).

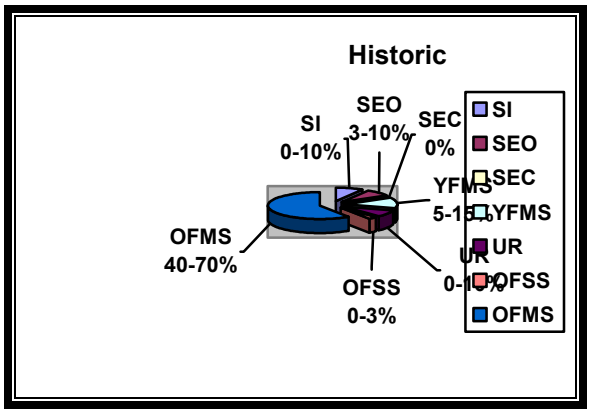


Figure 3-5. Historic Dry Forest - Hot Dry PAG.

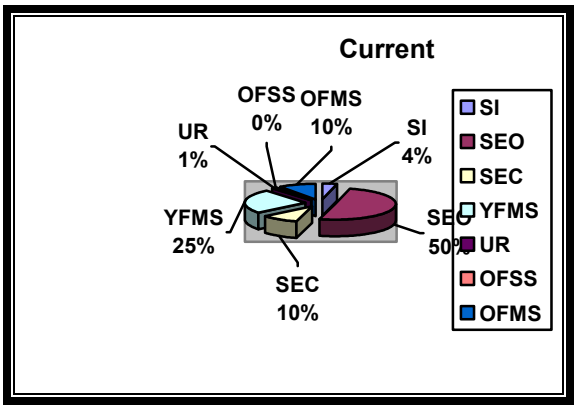


Figure 3-6. Current Dry Forest – Hot Dry PAG.

Figures 3-7 and 3-8 display the differences between historic and current Dry Forest, Warm Dry plant association group. Again note the large decrease in old growth (OFMS) stands and the increases in younger stands (YFMS and UR), where large trees are uncommon.

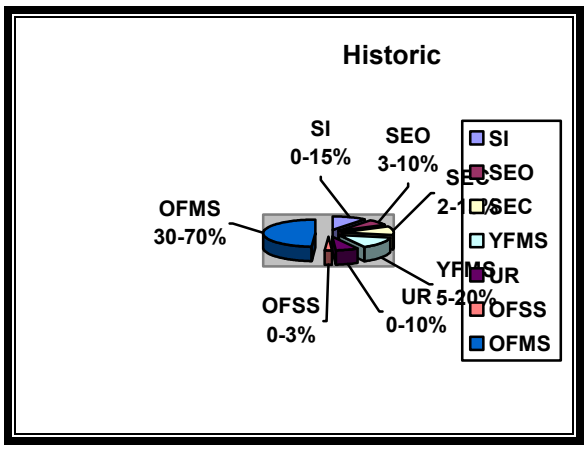


Figure 3-7. Historic Dry Forest – Warm Dry PAG.

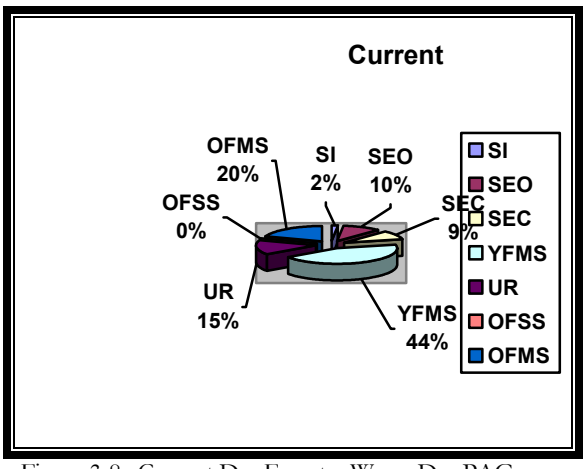


Figure 3-8. Current Dry Forest – Warm Dry PAG

Forest types, environmental settings, and disturbance regimes are generally relatively uniform across landscapes. However, analyzing HRV over such a large watershed may tend to mask significant changes that occur in localized areas. Within the Silvies Canyon watershed one significant change that is masked with a watershed HRV is the encroachment and conversion of non-forested land into forested land. Most of this encroachment has occurred in the southern subwatersheds. To display this significant change an HRV analysis was completed on a subwatershed basis.

Subwatershed HRV

HRV analysis was completed on a subwatershed basis to better display the significant change of encroachment and conversion of non-forested land into forested land. Most of this encroachment occurred in the southern subwatersheds. Stancliffe Creek subwatershed is shown below to display the magnitude of encroachment and conversion of non-forested land into forested land. Data for each subwatershed are located within the analysis file.

Figures 3-9 and 3-10 show the differences between historic and current conditions within the Stancliffe subwatershed. Current conditions display a significant decrease in non-forested acres (27-50%) and resulting increase in the Dry Forest, Hot Dry plant association group (33-35%). These data display the magnitude of conifer encroachment and conversion of non-forested land into forested land within the Stancliffe subwatershed.

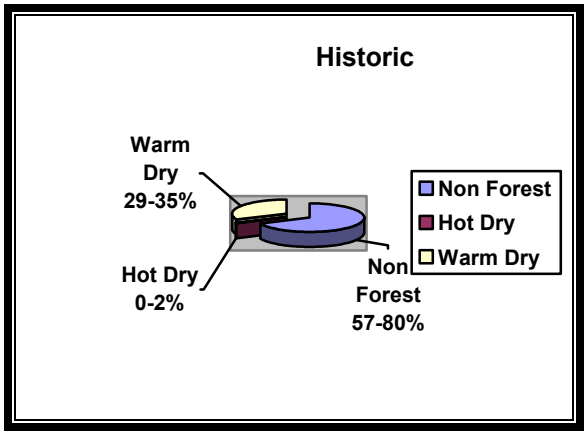


Figure 3-9. **Stancliffe Subwatershed Historic Conditions.**

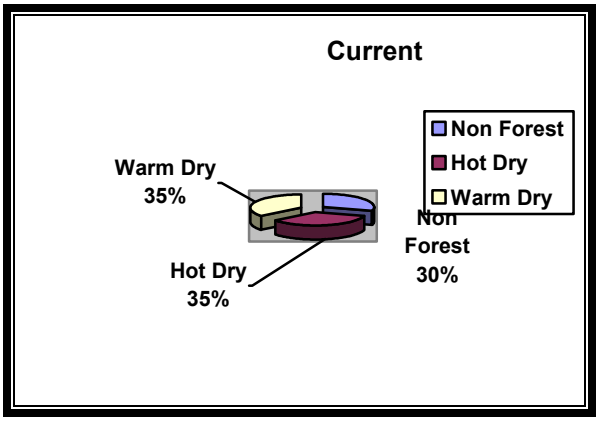


Figure 3-10. Stancliffe Subwatershed Current Conditions

Figures 3-11 and 3-12 show the differences between historic and current Dry Forest, Hot Dry plant association group within the Stancliffe subwatershed. Again, note the large decrease in old forest (OFMS) stands and the substantial increases in younger stands (SEO and SEC), where large trees are uncommon. This change is also magnified due to the large number of acres that have converted from nonforest to Hot Dry forest. Non-forested areas that have converted to Hot Dry forest have not had the time to develop into old forest structure.

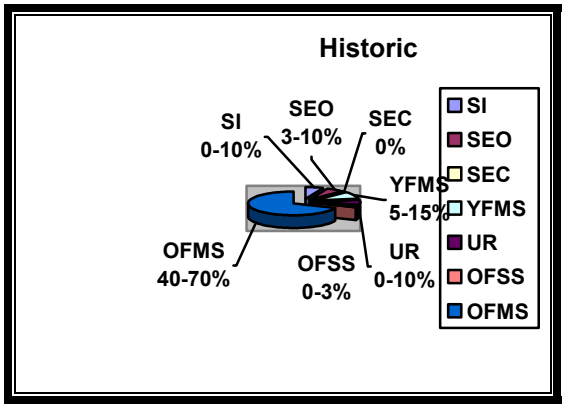


Figure 3-11. **Stancliffe Subwatershed Historic Hot Dry PAG.**

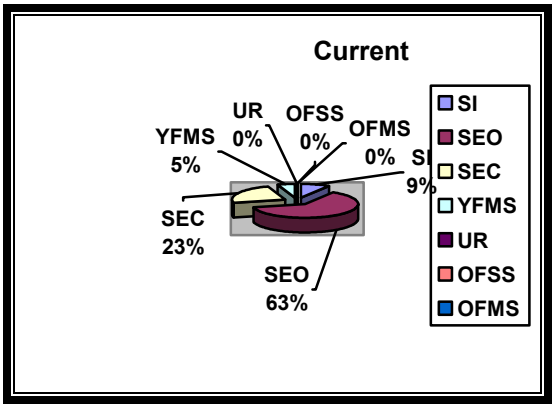


Figure 3-12. Stancliffe Subwatershed Current Hot Dry PAG.

HRV Conclusion

HRV was utilized to compare historical and current conditions. The objectives are to move towards historical conditions, not to historical conditions. The HRV analysis for the Silvies Canyon Watershed Restoration project area has determined the following conditions exist:

- The project area is lacking large trees (OFMS and OFSS) compared to historic numbers.
- The project area has an excess number of small tree stands (YFMS, SEO, SEC and UR) compared to historic numbers. This is primarily due to past management objectives of removing larger trees to release understory trees and effective fire suppression activities, which have facilitated the encroachment of pine and juniper onto historically non-forested lands.
- The project area, particularly the southern subwatersheds, has had a significant increase in forested lands and a subsequent decrease in non-forested lands. This is primarily due to effective fire suppression activities, which have facilitated the encroachment of pine and juniper onto historically non-forested lands.

Forest Pests

A variety of forest insects and diseases exist within the project area. Historically, the majority of these were present in low population levels due to lack of habitat because of the more pronounced role of fire. Due to gradual changes in densities of trees and composition of stands, current conditions are outside the normal range of variability. The high susceptibility of many stands to some of these pests is contributing to widespread mortality or constitutes a continuing threat of widespread mortality. This mortality and low vigor also increase the vulnerability of the area to stand-replacing wildfires.

Defoliators

Due to the harvesting of large trees coupled with fire suppression, conditions have become ripe for widespread defoliator outbreaks in the mixed conifer stands that have shifted from ponderosa pine dominated stands to Douglas-fir and white fir-dominated stands. Past management has contributed to stands with many different sizes of trees, and higher numbers of trees compared to historical conditions for the northern half of the project area. Although outbreaks of defoliators have occurred on a cyclic basis in the past (Swetnam et.al. 1995), the amount of area that supports vegetation that these defoliators attack is much greater than in the past and is more continuous over the landscape. As a result of these changes, stands have developed into favored habitat for such defoliators as Douglas-fir tussock moth (*Orgyia pseudotsugata*) and western spruce budworm (*Choristoneura occidentalis*), and for various bark beetles that often follow defoliator outbreaks (Buckhorn 1948, Wickman et al. 1973, Gast et.al. 1991, and Mason et al. 1998). Continuous-canopy, all-aged mixed conifer stands provide highly favorable habitat for defoliators. Larval stages of budworm and tussock moth feed primarily on true firs and Douglas-firs throughout their ranges. Past mortality and top kill can be seen throughout the area primarily in the mid to lower tree classes. Trees that have had top kill in the past have often formed multiple tops. Many of these stands have a stressed ponderosa pine over-story with a few or scattered pine under-story. Bark beetles (Douglas-fir bark beetles (*Dendroctonus pseudotsugae)*), fir engraver (*Scolytus ventralis*)) and woodborers often act as secondary disturbers, attacking and killing trees weakened by defoliators. Much of the past mortality is now contributing to the high fuel loads in this area.

Dwarf Mistletoe

There are a number of types of mistletoe; generally each mistletoe species is specific to a tree species. For example, dwarf mistletoe, which attacks Douglas-fir, does not attack white fir or ponderosa pine. In this project area the two mistletoes of most concern are Douglas-fir dwarf mistletoe and western dwarf mistletoe, which is specific to ponderosa pine.

Mistletoe often forms large brooms in host tree branches that reduce growth and eventually weaken and kill the tree. These large brooms increase the flammability and mortality of infected trees.

High levels of Douglas-fir dwarf mistletoe are causing tree and stand damage throughout the northern half of the project area. Western dwarf mistletoe is severe in some areas of Myrtle Canyon and scattered stands throughout the project area.

Bark Beetles

Western pine beetles (*Dendroctonus brevicomis)* historically were known for attacking and killing old, slow-growing ponderosa pine that were overstocked and susceptible to beetles due to drought and damage by fire (Munger, 1917). Once beetle populations increased in weakened host trees, they began switching to healthier green trees. In recent years with overstocking and drought causing low vigor in small diameter, even aged stands, western pine beetle has been known to cause extensive damage to all sizes of trees.

Mountain pine beetles (*Dendroctonous ponderosae*) are known for attacking and killing overstocked, low vigor pines (ponderosa, lodgepole, sugar, and white) throughout their range. Mountain pine beetles are endemic (Erickson 1906, Foster 1908) throughout their range but are noted for causing major damage in overstocked stands of 6-8" dbh trees, a size class that the beetles prefer (Sartwell 1971). They are thought to have been a regulator of stand density in the absence of other disturbances.

Douglas-fir beetles (*Dendroctonus pseudotsugae*) are common in most mixed conifer stands that have a Douglas-fir component. They usually breed in dead, diseased, or down material and cause little damage. Occasionally, Douglas-fir beetles may become a problem following large fires or other major disturbances such as outbreaks of spruce budworm or Douglas-fir tussock moth (Gast et al. 1991), at which point they act as a secondary disturber, attacking and killing trees weakened by other disturbances. In these situations, populations can build up to outbreak conditions.

Fir Engravers (*Scolytus ventralis*) attack true firs that have been stressed from other disturbances such as root rot, drought, or attacks from defoliators (Gast et al. 1991). Fir engravers often can cause major mortality in white fir trees.

Stem Decay

Indian paint fungus (*Echinodontium tinctorium*) attacks true firs with spores through tiny dead branch stubs (Foster 1908). The majority of the white fir in the project area has been inoculated with Indian paint fungus. The fungus remains dormant until the tree is stressed, usually by wounding. Once activated, it rapidly decays the wood.

Root Diseases

Annosus (*Fomes annosus*) **root disease** moderately damages lodgepole pine, ponderosa pine and true firs. Although it can damage Douglas-fir and larch, it seldom does. Annosus root disease can kill pines and fir, but mortality often is induced by secondary attacks from bark beetles. Infected trees usually die in clumps with mortality occurring over a number of years radiating out from the center of an infection site. The disease centers are usually focused around old infected stumps or large dead trees. To reduce the spread of this disease, fresh stumps 12" in diameter or larger can be treated with borax to inhibit the colonization of Annosus spores.

Black stain (*Ophiostoma wageneri*) **root disease** in this area affects ponderosa pine (Schmitt, 1993). The primary impact is tree mortality and is most often associated with second growth ponderosa pine.

Air Quality

Forest Service policy is to integrate air resource objectives into all Forest Service planning and management activities. A strategy for long-term air quality improvement was developed and signed by the Oregon Department of Environmental Quality (DEQ) *(Memorandum of Understanding (MOU) Between Oregon Department of Environmental Quality, Oregon Department of Forestry, USDI Bureau of Land Management, and USDA Forest Service in 1994).* This strategy is based on the assumption that light intensity prescribed burning in the spring and late fall create lower total smoke emissions than high intensity stand-replacement wildfires in summer and early fall. That agreement assumes prescribed burning could violate the Clean Air Act by going above the emission limits and target levels.

Oregon's greatest concern regarding air pollutants is the fine levels of particulate matter (PM) from wood smoke. Smoke emissions are monitored throughout the State of Oregon. When smoke emissions are determined to be too high, the agencies stated in the Memorandum of Understanding (MOU) will adjust, reduce or eliminate prescribed burning operations to comply with air quality objectives.

The Forest Service also maintains and protects air quality related values on class 1 areas as established under the 1977 Clean Air Act, which includes national wilderness areas larger than 5,000 acres that existed on August 7, 1977. This class provides the most protection to pristine lands by severely limiting the amount of additional air pollution that can be added to these areas. The Strawberry Wilderness Area is the closest class 1 area to the Silvies Canyon project area.

The annual PM10 standards (Oregon and Federal) are met when the annual mean concentration is less than or equal to 50 micrograms of pollutant per cubic meter of air. The 24-hour standard is met when the number of days per calendar year with a 24-hour average concentration above 150 micrograms of pollutant per cubic meter of air is equal to or less than 1 over a 3-year period. The annual PM2.5 standard (Federal, no Oregon standard) is met when the 3-year average of the annual arithmetic mean is less than or equal to 15.0 micrograms of pollutant per cubic meter of air and the 24-hour standard is met when the 3-year average of the 98th percentile values at each monitoring site is less than or equal to 65 micrograms of pollutant per cubic meter of air (DEQ Data Summaries, 2001).

DEQ data summaries for 2001 show that the Burns/Hines area has stayed below the state and federal standards for PM10 and PM2.5. According to DEQ report, the Burns/Hines area has not exceeded the limits of PM emissions in the last 7 years (1996 to 1991). There is no information for the year 2002. Burns now has surveillance equipment measuring PM10 and PM 2.5.

Sensitive Plants

Sensitive plants suspected to occur on the district are derived from the 1999 Region 6 Sensitive Plant List. The affected environment is identified by reviewing historical records of Region 6 sensitive plant occurrences in the project area, and by surveying areas of potential habitat for new populations of sensitive plants. Habitats suspected of harboring new populations are identified based on aspect, elevation, and plant association. Brooks et al. (1991) describes specific habitat features for Malheur National Forest sensitive species.

Deschutes milkvetch

Sensitive plant surveys were conducted in the Project area in 1994, 1996, 1999, 2000 and 2002. Potential sensitive plant habitats were reviewed by floristic walk-through survey during specific times of the year for peak plant identification periods (Nelson 1985). One new population of *Botrychium crenulatum* (crenulate moonwort) was found in August 2000. The documented sensitive plants from previous surveys include one population of *Lomatium ravenii* (Raven's lomatium) and fifteen populations of *Astragalus tegeterioides* (Deschutes milkvetch).

For additional information about the documented sensitive species in the project area, refer to the Biological Evaluation for Silvies Canyon (Appendix C).

Range Resources

The Malheur National Forest Land and Resource Management Plan (1990) allows for livestock grazing with the following stated goals (Forest Plan IV-2):

- Provide a sustained production of palatable forage for grazing by domestic livestock and dependent wildlife species.
- Manage rangelands to meet the needs of other resources and uses at a level that is responsive to site-specific objectives.
- Permit livestock use on suitable range when the permittee manages livestock using prescribed practices.

Primary and secondary ranges in the project area are in fair to good condition. Most of the forested areas are not providing forage at site potential. However, total forage production is not a limiting factor on the allotments at this time.

Monitoring of timber sales, precommercial thinning, and a variety of fuel treatments over the past decade indicate that seldom are tree canopies opened enough to provide lasting forage benefits. Fuels are rarely reduced to levels sufficient to provide good access and good herbaceous growing sites. Infrequent seeding following ground-disturbing activities, results in poor to no establishment of desirable forage species.

Range Improvements

Range improvements in the project area include allotment boundary fences, interior division (pasture) fences, livestock handling facilities at Rimrock Corral, developed and undeveloped springs, and reservoirs (ponds). There are approximately 108 miles of fence and 96 water developments within the project area. Many of the allotment fences were constructed in the 1950s when the Burns allotment was subdivided into several allotments. In the 1930s, the South Silvies fence on the Myrtle allotment was constructed by the Civilian Conservation Corp. Little Sagehen Flat fence was constructed in 1991 to protect the restoration project in the flat. The recreating public sometimes use spring enclosures and vegetation protection fences as horse confinement areas. Many improvements need to be reconstructed or partially reconstructed to maintain their function.

Pole Corral at Rimrock Springs, Summer 1999

Allotments

There are portions of eight grazing allotments within the Silvies Canyon project area. Nine permittees utilize these allotments, grazing an average of 10,532 animal months (AMs - amount of forage eaten per cow/one month). An estimated 8,092 AMs are permitted in the pastures the project area influences. Allotments involved are:

- **Silvies** - About 19% of this allotment is in the project area.
- **Big Sagehen** – About 80% of this allotment is in the project area.
- **Myrtle** - About 88% of this allotment is in the project area.
- **Crooked Creek** - About 21 % of this allotment is in the project area.
- **Rainbow** - About 19% of this allotment is in the project area.
- **West Myrtle** - About 82 % of this allotment is in the project area.

- **Scatfield** (administered by BLM) – 100% of National Forest land of this allotment is in the project area.
- **Scotty** (Blue Mountain RD) - About 9% of this allotment is in the project area.

Vegetation within these allotments is mixed. Timber types cover most allotments with ponderosa pine, Douglas-Fir and white fir being the dominant tree species. There are sagebrush/grass sites, meadow/stream riparian areas, and aspen stands. Non-forest vegetation includes juniper, grass, aspen, meadow vegetation, sagebrush, mountain mahogany and riparian shrubs (*Vegetation mapping* - 1979 - Burns Ranger District, *GIS* mapping).

Noxious Weeds

Oregon State Department of Agriculture (ODA) or Local Weed Districts designate species of plants as "noxious weeds." This designation refers to any species of plant that is, or is liable to be, detrimental or destructive to agricultural production and is difficult to control or eradicate. Weeds may be categorized as noxious because of the potential economic consequences of a weed invasion, or because of the threat to native vegetation communities and wildlife.

Characteristics of noxious weeds include a wide range of adaptability, rapid growth rates, abundant seed production, ability to re-sprout, ability to spread from vegetative or root fragments, and long seed viability in the soil. These attributes give noxious weeds a competitive edge over other plants and make them difficult to eradicate once established.

The current strategy emphasizes preventing the establishment of new weeds and slowing the spread of existing infestations. Decreasing the amount of ground disturbance, promoting establishment and proliferation of more desirable vegetation, and reducing the production and spread of reproductive plant parts are some of the means to implement the current strategy. The elimination and prevention of noxious weeds from the Emigrant Creek Ranger District is the long-term goal.

Mechanisms of Spread

The primary mechanisms for spread and establishment of noxious weeds are equipment, vehicles, people, animals, and roadwork moving reproductive plant parts from infested areas (on or off National Forest land) and depositing them in non-infested areas. Most of this activity occurs during the period mid June through October.

Existing Sites

At of the end of the 2002 field season, there were 77 inventoried noxious weed sites located in the Silvies Canyon Watershed project area, excluding the Blue Mountain Ranger District area (see Table 3-9). Of these, 65 were covered in the Malheur National Forest Noxious Weed EA, and will be treated manually. The remaining 12 sites will be analyzed for manual treatment under this EIS.

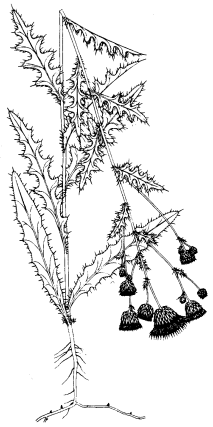
Inventoried sites may not represent the entire noxious weed population in the project area because every year there are new noxious weed sites found on the district.

Table 3-11. **Noxious weed sites in the Silvies Canyon Watershed Project Area.**

Weed Species	Number of Sites	Acres
Canada Thistle	40	5.45
Dalmatian Toadflax	5	0.5
Russian Knapweed	8	0.8
Spotted Knapweed	3	0.3
St. Johnswort	1	0.1
White Top	20	2.0
Total	77	9.15

Noxious Weed Species

Canada thistle is a relatively long-lived creeping perennial. Reproduction occurs from seed and buds on the roots, which sprout to form new plants if the weed is disturbed. Canada thistle seed is transported readily on vehicles.



Canada Thistle

Presently, Canada thistle is the most prevalent noxious weed inventoried within the project area. It has become very common across the forest. Most sites are along roads, but are increasing in riparian areas.

Knapweed Species readily establish themselves on any disturbed soil, and their early spring growth makes them excellent competitors for available soil moisture and nutrients. There is some evidence that knapweeds release chemical substances that inhibit the growth of surrounding vegetation. Knapweeds will reduce desirable plant communities if allowed to spread.

- ***Russian knapweed*** is the most prevalent knapweed species on the Emigrant Creek Ranger District. It is a perennial that can form dense colonies by adventitious shoots from widely spreading black roots; these roots can grow to eight feet deep. Reproduction occurs from seed and new plants will grow from roots left in the ground. Russian knapweed is found along Forest Roads 3100 and 3765.

- ***Spotted Knapweed*** is a biennial or short lived perennial with a stout taproot. Spotted knapweed is found on Forest Road 3145 and Highway 395, which provide access to the project area.

- ***Diffuse Knapweed*** is an annual or short-lived perennial 1 to 2 feet tall. It is located outside the project area on a main access road.

Dalmatian Toadflax is a perennial. Reproduction occurs from seed and root rhizomes. New plants will grow from roots left in the ground. It is often found in rock pits, but mainly along roads.

Dalmatian Toadflax

Common St. Johnswort is a perennial reproducing by seeds or rhizomes. It contains a toxic substance that affects white-haired animals. There is one known site along Forest Road 3100.

White Top is a perennial. Reproduction occurs from seed and root rhizomes. New plants will grow from roots left in the ground. White top is found along Forest Road 3100 and other disturbed areas along roads.

Houndstongue is a biennial growing 1 to 4 feet tall and reproducing by seed. It forms a rosette the first year and sends up a flowering stalk the second year. The nutlets (group of seeds) break apart at maturity and cling to clothing or animals. Houndstongue is toxic, containing pyrrolizidine alkaloids, causing liver cells to stop reproducing. Animals can live up to six months after ingesting a lethal amount of plant material (*Weeds of the West*, 1991). Currently there are no known existing sites within the Silvies Canyon project area; however, houndstongue is found along Highway 395 and Forest Road 3765, which provide access to the project area.

Risk Factors

- The project area has been altered, providing enhanced conditions for establishment of noxious weeds. These conditions include more sunlight to the soil surface, less organic material covering the soil surface, more exposed mineral soil, and increased soil disturbance.
- There are known noxious weed populations in Silvies Canyon Project area; additional populations nearby on the Forest constitute a source of reproductive material for establishment into the Project area.
- Vehicle traffic on Forest road 3100 acts as a dispersal mechanism for seed, both from within and outside the project area.
- Activities increase soil disturbance, vehicle traffic, and bring in specialized project machinery from possibly infested areas.

Socio-Economics

A social and economic analysis entitled *Silvies Canyon Watershed Restoration Project Final Environmental Impact Statement –Social and Economic Conditions and Effects* has been completed for this project (Kohrman 2003). This document is incorporated by reference under 40 CFR § 1502.21. The document presents social and economic affected environment information for this analysis. It provides information on human uses, social and economic characteristics, and conflicts among various users and uses of the ecosystem. It also discloses the health of the relationships among the people (community), the forest, and the larger ecosystem; perceptions and values related to ecosystem management; and recent social and economic trends in the economic region. The focus is primarily on but not limited to Grant and Harney Counties.

The local communities within an hour or two drive that are anticipated to be directly or indirectly affected by the proposed action, alternatives, and their associated economics include Burns/Hines (pop. 4,740), Dayville (140), John Day/Canyon City (2,500), Long Creek (230), Mount Vernon (600), Monument (150), Seneca (220), Sumpter (170), and Unity (130). Drewsey, Juntura, Prairie City and Riley are examples of other smaller communities also located in the vicinity. Larger cities two or more hours away from Burns-Hines area include Bend-Redmond (70,040), Ontario (11,140) and Prineville (7,750) (ODOT 2001). The nearest metropolitan area is Boise, Idaho, 3 hours away.

Primary Human Uses and Primary Users in the Silvies Canyon Watershed

The Silvies Canyon Watershed, a high use area in the southern end of the Malheur National Forest, is a destination area for numerous recreation and resource extraction activities. The following uses and users are known to occur in the project area.

Tribal Use

Northern Paiutes have inhabited and used the surrounding central southeastern region of Oregon, and Harney Basin, in which the watershed is located, for over 10,000 years. Silvies Canyon Watershed was part of the original proposed Malheur Reservation established by an 1872 treaty between the U.S. Government and the Paiute Tribe. Although Congress never ratified the treaty, and the Tribe was reimbursed for the original reservation in 1959 (at 1880 prices), the area remains extremely important to the Burns Paiute Tribe. The Burns Paiute Tribe has informed the Forest Service that the project area is used for "hunting, fishing, gathering, and religious purposes," and "every tribal family uses this region for cultural purposes" (Burns Paiute Tribe 2001). It is important for their culture for these practices to continue.

Other American Indian tribes may also have participated in hunting and gathering within the basin.

Recreation Use

In addition to traditional uses by the Burns Paiute Tribe, recreational use consists primarily of viewing scenery or wildlife, camping, hiking, hunting, snowmobiling, cross-country skiing, OHV use, horseback riding, firewood gathering and Christmas tree cutting. Regardless of the type of recreational use, access is key to how outdoor recreation resources are used. Recreation places easily accessed by vehicle have higher visitation rates than those located in remote, roadless areas.

About 53,000 acres of the project area supply roaded recreation, which is about 4.4% of the 1,197,300 acres available on the Malheur National Forest, including areas elsewhere on the Emigrant Creek Ranger district. Additional roaded recreation opportunities of several million acres exist on other public lands in the area. Most of the semi-primitive recreation opportunities with the project area are found within the Myrtle-Silvies Roadless area, comprising 11,700 acres. For more information on recreational use refer to the section titled "Recreation" on page 3-67.

Small Ranchers

Small ranches in the area are primarily family owned and managed businesses; many have been in the same family for generations. Despite the fact that many ranch families depend on a combination of farm and non-farm employment to remain economically viable, preserving the

ranching lifestyle and culture is important. Most small ranchers do not have a high profit margin and increased operation costs may mean the difference between earning a living and survival of their business and lifestyle. Much of the local ranching is accomplished using traditional means, and distinctive gear and attire.

Forest Products and Subsistence Use

The project area has historically been a source for cultural, lifestyle, and economic uses that are vital to local residents, as well as out of area visitors. The economies of the counties surrounding the project area are dependent upon resource extraction and export. Most of the wood products from the watershed are processed in John Day or Prairie City, with a much smaller portion (less than 10%) processed elsewhere.

A number of nontimber forest products and subsistence resources including Christmas trees, post and poles, firewood, mushrooms, livestock forage, fish, and an abundance of big and small game are available in the project area. This availability of resources, combined with its close proximity to the Burns/Hines communities, makes the area very popular with local residents, as well as out of area visitors.

The local communities generally have a low per capita income and a high percentage of elderly people on fixed income. A significant percentage of the population also receives some form of public assistance. Because of this, firewood is a primary heating source for residents due to its availability and lower energy cost. Firewood gathering for home use is limited in the Myrtle-Silvies Roadless Area because of the distance to roads. The rest of the project area has been used heavily used for firewood gathering because of its close proximity to Burns-Hines. Many families use big game and fish to supplement their food supply. Posts and poles are important for smaller ranching operations to reduce their operating costs and maintain their ranching facilities. Forage in the project area is important to local ranch operations.

Residential and Water Use

There is one irrigation diversion on Myrtle Creek within the project area. There are numerous irrigation diversions on the Silvies River both upstream and downstream of the Silvies Watershed. The Silvies River is also one of the major water sources for Malheur Lake and the Malheur National Wildlife Refuge located in the Harney Basin, which is a closed desert watershed.

Environmental Justice

Executive Order 12898 on environmental justice requires federal agencies to identify and address any disproportionately high and adverse human health or environmental effects on minority and low-income populations.

Minorities comprise 5.5% of Grant County, 9.9% of Harney County, and 31.2% of Malheur County, of which 25.6% is of Hispanic origin with the majority living east of Vale (Kohrman 2003 & U.S. Census Bureau 2003). The primary American Indian tribe involved is the Burns Paiute. With the exceptions of the Burns Paiute and Hispanics east of Vale, minorities are scattered throughout the counties.

Elderly people, especially those on fixed, low-incomes, and disabled people were also identified with potential to be impacted by various alternatives. A concern raised during public scoping

referred to maintaining motorized access for scenic driving, wildlife viewing, or big-game hunting for elderly or disabled people.

There is no quantifiable information on how much use the area receives from minority and low-income populations other than the information shared by the Burns Paiute Tribe.

Economic Base

The economic base of this region is dominated by the agriculture and forest products industries, with opportunities for tourism development. Wood products manufacturing, government (including local, state, and federal), farming, and agricultural services provide the basic sectors of Grant County's economy. Government, farming, and agricultural services are the primary economic sectors for Harney County (Crone et al 1999).

Four communities in Grant and Harney counties (John Day, Prairie City, Burns and Hines) have been identified as isolated timber dependent communities with high reliance in their economy on timber products and livestock forage (USDA 1996). These communities have been making extensive attempts to diversify their economies, with only limited results. High transportation costs, limited infrastructure, and lack of skilled labor severely affect the ability to attract new industries. Recent data shows that economies of rural communities in the inland northwest having a business infrastructure including wood products and forestry are more resilient than those economies based largely on agriculture (Harris et al 2000).

Employment and Income

The communities surrounding the Silvies Canyon area are considered rural in character and have a disproportionately high unemployment rate compared with National and State figures, as well as a disproportionately low average income. See Table 3-12 for a comparison (OED 2003a).

Table 3-12. Comparison of National, State and Local Unemployment and Income Averages.

		Averages	
		Unemployment Rate (%)	Income ($)
Locations	United States	5.8	36,214
	Oregon	7.3	33,202
	Grant County	14.6	24,492
	Harney County	13.1	23,308
	Baker County	12.6	24,190
	Malheur County	11.4	23,163

Forest management and cattle production are the main industries supporting Grant and Harney Counties. Grant County is experiencing its sixth consecutive year of declining non-farm employment, and this is quite possibly the longest ongoing downturn any local Oregon labor market has ever experienced (OED 2003).

Recreation-based industries, while prevalent elsewhere in the region, have not been a major contributor to the local economies. Recent efforts indicate that the volume of business is only enough to supplement income rather than provide a primary source of income (Harney County Chamber of Commerce 1998-2000). The exception is hunting season, which typically draws larger numbers of people into the area. Stores that sell sporting goods benefit during this period.

Seasonal limitations, the dispersed nature of recreation within the counties, along with a general lack of large, water-based recreational opportunities does not create the concentrated numbers of recreationists and readily identifiable recreation destinations necessary to support many recreation industries (Oregon Department of Tourism 2001).

Unemployment

Grant County's annual average unemployment rate declined in each of the past two years. The 2001 annual average jobless rate of 10.3 percent was Grant County's lowest since 1995. Harney County's unemployment rate in 1998 was the lowest it has been in close to 20 years. It has risen recently to the highest rate (14.1%) in five years (USDA 2003). These higher rates are primarily due to the seasonal nature of jobs, less diversified job market for local job seekers, and higher reliance on industries that are either declining or, at least, are not growing to the same extent as other industries more prevalent in Oregon's metropolitan areas. Figure 3-13 illustrates average annual unemployment rates for the past five years in Grant and Harney counties.

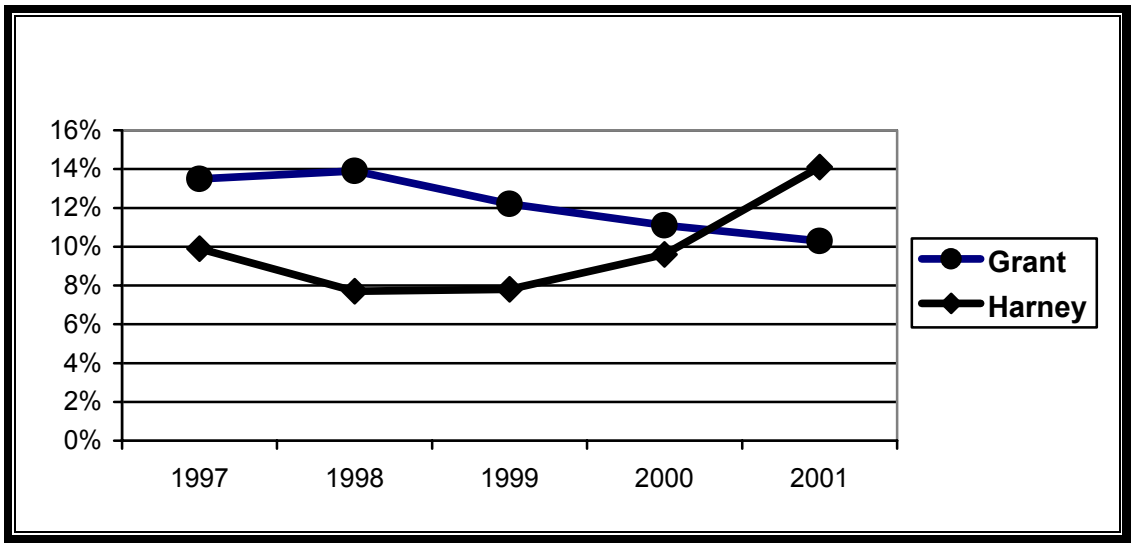


Figure 3-13. Average Annual Unemployment.

While unemployment figures reflect the project area situation as a whole, members of the Burns Paiute Tribe often experience much higher unemployment rates, sometimes reaching as high as 50 percent (OED 1997). The Tribe has made a number of attempts to improve employment for members with varying success. Currently, a small gambling casino at the edge of Burns and a farm enterprise on the reservation provide some employment. The Tribe has recently obtained a ranch in Logan Valley, located near Prairie City; and another near Juntura, Oregon, adding significantly to their land base.

Commonly, following a long period of high unemployment in rural areas, the work force shrinks for two reasons: (1) people leave to seek work elsewhere, or (2) people become discouraged and stop seeking work (OED 2001). The relatively low proportion of population in the 18-64 year range suggests that as people become more experienced or gain work skills, they seek work outside the area either for better pay or for better work stability. Young workers, those with small children, or those just starting their work careers; may remain until they can gain work experience, at which point they leave to seek higher paying jobs elsewhere. This would account for the higher number of residents under the age of 18, compared to 18-64 year old residents.

Economic Diversity

The Grant and Harney economies are not very diverse, relying primarily on raw material export, mostly in the form of wood products, livestock, or agricultural products. Nearly one-third of the livestock producers in the Grant County and half in Harney County depend on forage on federal lands (McGinnis et al. 1996). Tourism is a small, but growing portion of the economy. Any negative influences affecting these basic industries are quickly reflected in the Counties' economy. The results of increased market competition and less available wood fiber due to environmental restrictions in the recent years have been deeply felt within Grant and Harney Counties. This situation is not expected to improve in the near future. Harney County has been trying since the early 1990s to diversify its economy with limited success. Transportation cost and limited industrial infrastructure are major drawbacks to these efforts. Another factor affecting the economic situation of both counties is that local workers are highly skilled in resource-related work, but tend to have limited knowledge and skills for computer-oriented job limiting opportunities for this type of work. A number of residents also have multi-generational ties to the lifestyle and area and may be reluctant to seek work elsewhere.

Recent Timber Trends

The 1990 Malheur National Forest Land and Resource Management Plan (LRMP) established an allowable sale quantity (ASQ) for the forest of 38.4 million cubic feet or 211 MMBF average per year. An ASQ is an upper limit for the plan period, not a proposal for sale offerings or assigned targets. Actual sale levels depend on factors like: limitations of modeling, changes in law and regulations, changes in social-economic values, listing of threatened and endangered species, changes in budgets, and site-specific conditions. The Regional Forester amended this plan in 1994 through Amendment No. 2 (Eastside Screens), and by PACFISH and INFISH in 1995 in response to some of these changing factors. Table 3-13 compares the Malheur National Forest's annual offered timber volume with its assigned target timber volume for the fiscal year since the 1990 LRMP went into effect. Accomplishment of timber targets is based on volume offered.

Table 3-13. Malheur National Forest Timber Offer by Fiscal Year 1991 to 2002.

Fiscal Year	Target Volume MMBF	Offered Volume MMBF
1991	229.0	201.6
1992	220.0	100.8
1993	197.0	71.7
1994	101.0	33.1
1995	85.0	66.9
1996	100.0	80.9
1997	110.0	38.9
1998	95.0	77.1
1999	63.5	34.1
2000	45.0	17.5
2001	36.7	15.4
2002	24.2	2.7

In response to a request by then Oregon Governor Kitzhaber, the Blue Mountains Demonstration Area published in 2002 an assessment entitled *Assessment of Timber Availability from Forest Restoration with the Blue Mountains of Oregon* (USDA 2002). The assessment described

management actions over the past decade, current vegetation conditions where a reliable supply of wood could be available, estimates the quantity and type of forest timber products that may result from forest restoration actions, and a market analysis for potential timber products and the associated economic impacts on individual communities.

This assessment concluded that 71% of the national forest lands in the Blue Mountains of Oregon were not available for substantial and sustainable harvesting of timber. It further concluded that the remaining 29% of the national forest lands that are available for substantial and sustainable timber harvest (Active Forestry lands) was actively managed over the last three decades. Up to a third of these lands have experienced timber harvest or non-commercial thinning since 1988. Approximately 58% of these Active Forestry lands are currently overstocked. However, nearly half of these overstocked lands are suitable only for non-commercial thinning treatments, yielding only incidental amounts of merchantable timber.

Wildlife

Big Game Habitat

Rocky Mountain elk (*Cervus elaphus*) and mule deer (*Odocoileus hemionus*) use many plant communities and successional stages; they need a mixture of hiding and thermal cover, forage areas, calving/fawning, and rearing areas.

Human-related factors combined with ongoing successional processes have greatly altered the habitats of elk and mule deer. How elk and mule deer populations have responded to these changes has varied. In the project area, elk and deer have apparently benefited from past events that have shaped and manipulated current vegetation across much of the project area and adjoining landscape (see Big Game Population Management Objectives, below).

Cover

Four conditions/actions have determined the extent of existing canopy cover in the Silvies Canyon project area: natural conditions (low site potential and past fire history), past harvest, recent growth of trees in formerly non-forested areas, and increased stocking and changes in tree species composition due to past treatment or lack of treatment. Natural conditions related to the amount of non-forested land (23% of the project area) and to hot dry and warm dry forest limit both the growth and sustainability of trees and canopy cover in the project area (see LOS discussion below). Past harvest (between 1982 to present) has removed timber on about 15,000 acres in the Silvies Canyon project area. It's estimated that 6,000 to 10,000 of these acres may have provided marginal or better cover prior to harvest. Up to 6,000 acres of these past harvested areas have regrown or are close to regrowing into marginal cover. In addition, 13% of historically non-forested areas (4,000-8,000 acres) have grown into forest (Fire Specialist Report). Much of the area that has gone from non-forest to forest is presently marginal cover, though this level of canopy cover is not expected to be sustainable. Current tree stocking is uncharacteristically high throughout the area. Tree stocking has increased both in basal area (2-4 fold increase) and in stocking levels (10 fold increase) (Vegetation Specialist Report). Many areas that are near or are currently meeting standards for cover reflect this increased stocking rate. Many of these stands would not have met satisfactory cover standards historically (see section on LOS).

There are approximately 53,000 acres (65.1% of project area) of summer range in the project area and approximately 28,500 acres (34.9% of project area) of winter range. Forest Plan standards were used to calculate the amount of satisfactory [thermal] cover (stands with a canopy closure of at least 60%) and marginal [thermal] cover (trees greater than or equal to 10 feet tall with a canopy closure of at least 40%) on summer and winter range. Sage Hen Creek is the only subwatershed that meets Forest Plan standards for satisfactory, marginal, and total cover in summer range (see Table 3-14). Six of the seven subwatersheds are currently below Forest Plan standards for satisfactory cover (with four of those subwatersheds not meeting total cover) due to past harvest, natural conditions and low site potential on summer range.

The USDA Forest Service manages 4% (714 ac.) of the summer range in the Red Hill subwatershed; the remaining 96% (17,258 ac.) of Red Hill is under other management. The non-Forest Service lands in Red Hill subwatershed are mostly open sagebrush, which provides forage but would never be forest and therefore would never provide cover or good cover distribution. Cover and HEI were initially calculated using all summer range in the entire Red Hill subwatershed. Analysis of effects at the subwatershed scale in Red Hill showed virtually no change in cover and HEI between existing conditions and alternatives with the maximum amount of harvest or road closure. At this scale, Forest Service actions would have appeared to have no effect. To be able to display and measure the change between alternatives in this FEIS, cover and HEIs have been calculated for the portion of summer range managed by the Forest Service. Since the Malheur National Forest can only influence the Forest-managed portion, the cover and HEI tables only display data on the Forest Service portion of the Red Hill subwatershed.

Four subwatersheds do not meet Forest Plan standards in winter range (Table 3-16) due in part to past harvest, low site potential in many areas, and large areas of non-forest habitat that occur within winter range.

Table 3-14. Cover in Summer and Winter Range by Subwatershed.

	Summer Range			Winter Range		
Subwatershed	**Marginal Cover**	**Satisfactory Cover**	**TOTAL Cover**	**Marginal Cover**	**Satisfactory Cover**	**TOTAL Cover**
Boulder/Fawn	14%	**3%**	**17%**	22%	**6%**	**28%**
Burnt Mtn.	15%	**1%**	**16%**	19%	16%	35%
Myrtle Creek	**4.0%**	**5%**	**9%**	40%	19%	59%
Myrtle Park	25%	**5%**	**31%**	51%	21%	72%
Red Hill (Forest-managed part)**	27%	**0%**	**27%**	13%	**0%**	**13%**
Sage Hen Cr.	47%	12%	59%	31%	**5%**	**36%**
Stancliffe Cr.	**9%**	**0%**	**9%**	12%	**0%**	**12%**
FP Standards	***5% min.**	**8% min.**	**20% min.**	**10% min.**	**8% min.**	**25% min.**

Does not meet Forest Plan standards

*Satisfactory cover can be substituted for marginal cover when standard is exceeded.

Road Density

The Forest Plan establishes road density standards at the watershed level, excluding private land and wilderness in the calculation. Approximately 16,300 acres of Red Hill, Burnt Mountain, and Myrtle Cr. subwatersheds were excluded from the analysis because the Malheur National Forest does not manage this area.

The modified project area used to analyze road density and HEI included 1,962 acres of private and 63,174 acres of land managed by the Malheur National Forest. There are approximately 375 miles of open roads (including four miles of private roads) in this modified Project Area, including about 63 miles of roads that were designated for closure under past decisions. Closure of these roads is occurring or is planned to occur regardless of this project's outcome. Because the 63 miles of open road designated for closure under past decisions are or will be closed, open road densities were calculated as if those 63 miles of road have been closed.

To conduct a meaningful analysis of road density on a site-specific level, road density was calculated at the subwatershed level, and further divided into winter and summer range. Based on calculated winter and summer range acreage and GIS database road length analysis, open road densities range from about 5.2 to <0.1 mi/mi^2 (see Table 3-1 in the Access and Travel Management Section).

Use of roads by off-road vehicles (e.g. OHV or snowmobile), where allowed, is included here as road use in road density and habitat effectiveness calculations. Off-road use by recreational vehicles is currently allowed throughout the area, except in the Myrtle-Silvies Roadless Area. The exact amount of this use and its effects to existing condition of elk and other wildlife are likely additive, but unknown. No data is currently available on actual OHV use in the Silvies area. Estimates by a recreation technician suggest moderate off-road use in summer and heavy use during hunting season (15-20 vehicles/day in summer, twice that in hunting season; Pat Ruvio, Pers. Observ.).

Habitat-Effectiveness Index

To comply with the Forest Plan standard #28 (FP IV-27) an elk habitat effectiveness analysis has been completed for the Silvies Canyon watershed (see Table 3-15).

Currently, high road densities limit summer and winter range HEI values. Low cover values somewhat limit HEI.

Table 3-15. Summer and Winter Range HEI Values.

	Summer Range				Winter Range				
Subwatershed	**HEc**	**HEs**	**HEr**	**HEI**	**HEc**	**HEs**	**HEr**	**HEf**	**HEI**
Boulder/Fawn	0.58	0.34	0.41	0.43	0.61	0.45	**0.48**	0.40	**0.48**
Burnt Mtn.	0.52	0.50	**0.30**	0.43	0.73	0.51	**0.47**	0.40	0.51
Myrtle Cr.	0.78	0.24	**0.18**	**0.32**	0.66	0.42	0.50	0.40	**0.48**
Myrtle Park	0.58	**0.43**	**0.29**	0.42	0.65	0.63	0.97	0.40	0.63
Red Hill *	0.50	0.49	**0.32**	0.42	0.50	0.33	**0.41**	0.40	**0.41**
Sage Hen Cr.	0.60	0.69	**0.38**	0.54	0.57	0.61	**0.40**	0.40	**0.49**
Stancliffe Cr.	0.50	0.32	**0.39**	0.40	0.50	0.45	**0.32**	0.40	**0.41**
FP standard	**0.30**	**0.30**	**0.40**	**0.40**	**0.40**	**0.30**	**0.50**	**0.40**	**0.50**

Does not meet Forest Plan standards

c=cover **s-spacing** **r-roads** **f-forage quality & quantity**

***Values displayed above are for the portion of the subwatershed that is managed by the Forest Service and is within the Forest boundary only.**

Calving and Fawning Habitat

Over 30,000 acres of the riparian habitat and gentle (1-15%) slopes found throughout the planning area meet the basic criteria for calving and fawning habitat. There is likely use of these areas, but information of where this habitat is located is not available. Little information is available on the condition of these areas. Livestock grazing may have reduced shrub cover, particularly in riparian areas (see Fisheries Specialist report).

Big Game Population Management Objectives (MOs)

The Silvies Wildlife Management Unit is about 1,821 mi^2, of which about 68% is public land. It covers the area between State Highway 20 and 395, and between Izee, Suplee, and near Hampton, Oregon.

In a 1919 Forest Service report, total forest dwelling big game populations were estimated to be 20 elk and 1,150 deer (Mosgrove 1980). Annual legal harvest was five elk and 195 deer. Poaching also occurred. By 1942, big game populations were estimated to be at 1,900 elk and 55,000 deer. In the intervening years, better game law enforcement, large-scale predator extermination programs, and increases in browse species (early intensive livestock grazing reduced competition by perennial grasses and declines in grazing level allowed shrubs to rebound) contributed to the dramatic increase in population densities on the forest.

Recent population estimates in the Silvies Wildlife Management Unit are at ODFW's management objective of 2,200 overwintering adults. Elk numbers were above objectives in 2001 and 2000 at 2,500 and 2,600. Through hunter harvest management, those numbers have been reduced to objectives. This indicates that the population is healthy and viable. ODFW estimates that about 250 summer adult elk inhabit the Silvies Canyon project area (ODFW, R. Garner, pers. com.). Elk appear to be doing well in this unit because the area provides "plenty of habitat" (in the form of space, hiding cover, and forage – ODFW, R. Garner, pers. com.). Components that could be limiting elk use on Forest Service System lands include high quality forage and human disturbance due to high density of roads (R. Garner, pers. com.).

The 2000-2002 Silvies Wildlife Management Unit mule deer population was estimated to be about 9,500-10,000 over wintering adults. ODFW population estimates indicate deer numbers have averaged 80% of management objectives over the past several years (objective - 12,000 deer, ODFW will be reviewing these objectives over the next few years). This indicates that the population has not reached its potential but appears to be stable. The reduced amount and palatability of shrubs (due partially to forest succession and fire suppression) as well as increased predation may be the cause for low mule deer populations (Unknown 1990-Mule Deer Plan for the State of Oregon and R. Garner, pers. com.).

Proposed, Endangered, Threatened and Sensitive Species

For Proposed, Endangered, Threatened and Sensitive (PETS) animal and plant species, surveys and analysis were conducted from 1992-2002. A prefield database review was also conducted.

Field reconnaissance was conducted to:

- Assess the project area to identify potential PETS habitat;
- Search suitable habitat for PETS species occurrence (if present);

- Confirm that known habitat is suitable (if present); and
- Refine knowledge of habitats that exist on the landscape and how species use their habitat.

The prefield data base review and field reconnaissance identified occurrence, suspected occurrence, or potential habitat for the following PETS:

- Gray wolf
- Bald eagle
- Canada lynx
- Wolverine
- Pygmy rabbit
- Peregrine falcon
- Western sage grouse
- Gray flycatcher
- Bufflehead
- Columbia spotted frog

The Silvies Canyon Watershed Restoration Project Biological Evaluation/Assessment (see Appendix C) discusses existing condition of these species and their habitat and the effects that the proposed action and alternatives have on these species. The following is summarized from those documents. Existing condition for these species is as follows:

Gray Wolf

Historically, wolves occupied all habitats on this Forest (Wisdom et al. 2000), but are currently considered extirpated. The three Blue Mountain Forests are probably suitable habitat for wolves. Over time, wolves dispersing from the growing experimental, non-essential central Idaho wolf population could return to the Blue Mountains and establish packs.

Bald Eagle

Occupied bald eagle nesting habitat (the Silvies River nesting territory) and two potential winter communal roosting sites are located in the project area. Due to overstocked understories and heavy accumulations of fuels, nest and roost stands are at risk from stand-replacing fires and epidemic insect attack.

Canada Lynx

Based on records and available collections, Verts and Carraway (1998) conclude that there is no evidence of self-maintaining populations of lynx in Oregon and USDI (1997) considered the species extirpated from Oregon. There are small, scattered primary vegetation blocks (lodgepole pine) present on the project area; these total about 294 acres, and mostly are located in the northern portion. There are also about 1,000 acres of small, non-continuous secondary vegetation blocks in portions of the project area that include grand fir, aspen and alder plant associations. Most grand fir plant associations are dry sites that do not qualify as secondary lynx habitat.

Wolverine

Wolverines were always rare in Oregon, although recent sightings, tracks, and collected remains document their continued presence at low densities in the state (Csuti et al. 1997). Current distribution appears to be restricted to isolated wilderness areas. The most recent unconfirmed sighting of a wolverine on the Malheur NF was reported in 1994, in the Silvies Canyon Watershed.

Source habitat is very limited in this project area. There are no subalpine forest types with or without talus surrounded by trees in or adjacent to this area. Montane forest types within the northern portion of the

project area may provide marginal or poor winter foraging habitat for wolverines. Because wolverines are sensitive to disturbance, the high levels of human disturbance (recreational use, firewood cutting, and management activities) reduce the suitability of the area for wolverine. The likelihood of wolverine using or frequenting the area is low.

Pygmy Rabbit

Pygmy rabbits are closely tied to habitats dominated by big sagebrush (*Artemisia tridentata*) growing on deep, loose, friable soil types (Verts and Carraway 1998, WDFW 1995). GIS analysis indicates four small shrubland stands of mountain big sagebrush plant association habitat, totaling 120 acres, widely scattered across the southern end of the watershed. This plant association is described as rough to rolling, or undulating terrain with mountain big sagebrush and bunchgrasses growing in deep, stony soils (Johnson and Clausnitzer 1992). Because of limited quantity and quality of habitat, the likelihood of pygmy rabbits occurring in these areas is low.

Peregrine Falcon

In 1992, surveys to identify probable nest sites were conducted on the Malheur National Forest (Pagel 1992). The potential for nests at various locations were identified and rated from no to high potential of use according to specific habitat criteria. The closest potential nest site is located within Silvies Canyon. Pagel (1992) classified this site as having a "medium" potential. No observations have been recorded of peregrine falcon use in this area. In July 2000 a pair of peregrine falcons with an immature were sighted near Yellowjacket Lake. In response to the observation of peregrine falcons in the adjacent watershed, potential nesting habitat within the Silvies Canyon Watershed was monitored twice in 2003 (once during the courtship/egg laying period and once during the hatching period). Peregrine falcons were not observed in the watershed and were not found nesting. The presence of an apparently successful breeding pair near Yellowjacket Lake suggest that peregrine falcons are breeding somewhere on or near the Malheur National Forest. As well as being a sensitive species, peregrine falcons are also listed as "Birds of Conservation Concern" in the Great Basin by the US Fish and Wildlife Service (2002).

Western Sage Grouse

Individual sage grouse have been noted within the project area. A lek site was recently reported just south of the southern border of the project area. Population information and other lek sites are unknown inside the project area. Historically there may have been substantial numbers and use in the area of Little Sage Hen Flat and along Sage Hen Creek. Sage grouse may nest inside the project area in patches of sagebrush within two miles of the reported lek (Call and Maser 1985). However, suitable nesting habitat is available in abundance outside the project area south of the reported lek. No information is currently available on use of the project area for nesting. Marginal quality potential late-season brood rearing habitat exists in sagebrush-steppe in the south end of the project area. There is no key late brood-rearing habitat identified in the project area. Use appears to be occasional and random within suitable habitat. As well as being a sensitive species, "Greater Sage Grouse" are also listed as "Birds of Conservation Concern" in the Great Basin by the US Fish and Wildlife Service (2002).

Gray Flycatcher

Abundance surveys confirmed the presence and general abundance of gray flycatchers near Silvies Canyon Watershed during roadside surveys on Breeding Bird Survey (BBS) route Ore-248: Silvies (0.01 birds/route-very low abundance) (USGS 2000). Presence and density information is not available for the Silvies Canyon Watershed.

The project area has about 10,691 acres of shrublands, most of which occurs in the south end of the watershed. While not all of the shrubland/nonforested areas found in the watershed provide habitat for this species, much of the shrubland habitat is potential habitat. Gray flycatchers are likely to inhabit the south end of the watershed.

Bufflehead

This species does not occur on the Malheur National Forest during the breeding season (USGS 2000, Csuti et al. 1997), but migrating/overwintering birds may be found on the Silvies River.

Columbia Spotted Frog

This frog is present in all subbasins on the Malheur National Forest. Confirmed sightings occur in Myrtle Creek and North Fork Myrtle Creek. It is thought to be widely distributed in the project area. Habitat has been reduced or degraded due to past management activities such as grazing, road construction along streams, and timber harvest adjacent to streams, lakes ponds, springs, and marshes.

Management Indicator Species (MIS)

To maintain viable populations of existing native and desired non-native vertebrate populations, the Malheur National Forest established a list of MIS that can be used to monitor the effects of planned management activities on wildlife.

Selected MIS may reflect a mix of threatened, endangered, or sensitive species; species commonly hunted, fished or trapped; non-game species of special interest; or species selected because their population changes are believed to indicate the effects of management activities on species of selected major biological communities or on water quality.

Rocky Mountain Elk

Rocky Mountain Elk was selected as a MIS due to its economic and social values, and its response to changes in forest cover, road densities, and forage quality.

Indicators of Old Growth and Late- and Old-Structure Habitat

Pileated, and three-toed woodpeckers and American marten are Management Indicator Species (MIS) for old growth and dead and defective tree habitat. White-headed woodpeckers are an MIS for dead and defective tree habitat, but are strongly associated with old growth habitat, so are considered here. Northern goshawk is not considered a MIS, but Amendment #2 of the Forest Plan identifies the goshawk as an important indicator for interior late and old structure habitat.

Pileated Woodpecker

Habitat requirements of the pileated woodpecker include stands of mature or old growth mixed conifer or ponderosa forests with two or more canopy layers or younger forests that contain large or old growth remnants. Thomas (1979) reports this species using mature (80-159 years) to old growth (160+ years) for reproduction and foraging.

Over the last nine years, there have been 18 documented sightings of pileated woodpeckers within the project area. These reports include individual and pair occurrences within DOGs, general forest and potential eagle roost stands. In 1992, formal breeding pair surveys were conducted to determine pileated presence in several DOGs in the project area (Becher 1992). DOG 011 and DOG 015 each had one pair of pileated woodpeckers present. Incidental observations of pileated pairs/singles were documented in DOG 012, DOG 016, Silvies River potential eagle roost, Myrtle Park area, and Stancliffe/Silvies area.

These sightings occurred during the breeding season, indicating that these areas may also have occupied nesting habitat. Additional observations of pileated woodpeckers within the project area are documented in the district wildlife database (Wildobs, wildlife project record).

Based on available data, there are at least seven probable pileated woodpecker territories in the project area; most center on MAs that limit or restrict timber harvest. Potential territories in Myrtle Park and Stancliffe/Silvies occur in general forest and big game winter range respectively.

Project area DOGS meet some of the pileated woodpecker management recommendations developed by Bull and Holthausen (1992) particularly in terms of vegetation types, size of core old growth, and canopy closures. However, these DOGS are not as large as pileated woodpecker home ranges in Bull and Holthausen (1992) and do not provide down wood, and in most cases snags, at their suggested levels. Current research (Bull and Holthausen 1992) indicates that at least 4 large snags/acre are needed to provide nesting and feeding habitat for pileated woodpeckers.

Although current literature suggests that larger home ranges might be needed, the Forest Plan assumed that a breeding pair needed 300 acres of quality nesting habitat plus an additional 300 acres of foraging habitat, and that 5 miles (or approximately one pair every 12,000 acres) was a suitable maximum dispersal distance to assure population viability (USDA Forest Service 1990, FEIS, Appendix G).

As discussed under snags and DecAID (Mellen et al. 2003), much of the project area may not provide a sufficient density of medium (10-inch dbh) and large (20-inch dbh) snags to provide optimal habitat for pileated woodpeckers.

White-headed Woodpecker

The white-headed woodpecker selects home ranges dominated by old-growth ponderosa pine. Dixon (1995) found the majority of nests and all roosts were in ponderosa pine forest types with <57% canopy closure. These birds nested mostly in ponderosa pine snags, but also used live and dead quaking aspen, white fir snags, and ponderosa pine stumps. White-headed woodpeckers use large diameter (>20" dbh) snags for nesting and for roosting in greater proportion than available. This relatively narrow habitat niche occupied by the white-headed woodpecker makes it strongly dependent upon open stands of large-diameter live ponderosa pine.

White-headed woodpeckers in Oregon and Washington are not found in all ponderosa pine forests having large trees. This is particularly true of those forest stands that have high canopy cover resulting from a dense understory of younger trees (Marshall 1997).

Due to the high commercial value of ponderosa pine, it has been intensively harvested in the past. Where ponderosa pine was not harvested, it was protected from natural and human-caused fires. Long-term suppression of natural fires, subsequent absence of natural fire regimes (frequent, cool ground fires), and past harvest strategies have, over time, allowed ground fuel accumulations and unnatural encroachment by Douglas-fir and white fir in the understory and midstory of productive white-headed woodpecker habitat (Fire and Vegetation Specialist Reports). Consequently, these habitats have become predisposed to increased risk of stand replacement wildfire and subsequent salvage, a cycle which prevents individual trees and many stands from reaching the large size and decayed conditions critical to this woodpecker.

There have been 10 incidental observations of white-headed woodpecker pairs/individuals in the watershed. This area currently provides poor to marginal habitat for white-headed woodpeckers. It has

remnant old growth pine stands and mixed conifer stands with remnant pine LOS structure that are capable of supporting minimal numbers of this old growth associated species.

Three-toed Woodpecker

This species is usually found in mature or old growth lodgepole pine, and can also be found in fir forest types with a strong lodgepole pine component (Marshall 1992a). This species' typical habitat types are not abundant in the project area; however, lodgepole stands of varying age and condition exist in the very northern portion of the project area (Blue Mountain Ranger District). In this area, two old-growth lodgepole areas (two blocks, 79 and 80 acre, designated by Blue Mountain Ranger District) are available for this species. These dedicated blocks of nesting and foraging habitat provide core habitat for possibly two breeding pairs of three-toed woodpeckers. These areas are insufficient to support an entire home range but may be key habitat in the managed forest landscape.

There have been two incidental observations of individuals in the watershed near the Blue Mountain Ranger District's three-toed woodpecker management areas.

American Marten

The watershed is south of the current distribution range for marten and the DOGs are not considered optimal or suitable marten habitat. Hot dry and warm dry ponderosa pine forest, which makes up most of the project area, do not provide habitat for marten (Wisdom et al. 2003 [Vol. 3]). Less than 1% of the Silvies Canyon project area (294 acres) is classified as lodgepole pine, a habitat type that is used by marten. This habitat type is found in small, discontinuous pockets. No other habitat types typically used by marten are present in the project area.

Marten have not been observed in or near the Silvies Canyon project area, the project area is outside the known range of marten, and there is little potential habitat for marten in the project area. Therefore, marten are not likely to be present in the project area.

Northern Goshawk

Northern goshawks are known to use interior forests habitats of mature and old growth. These raptors prefer mature and over mature stands in mixed conifer with overstory ponderosa pine, but need a more open understory or openings for hunting compared to other interior forest raptors. Nests are often within ¼ mile of flowing water (De Stephano, 1992). Goshawk ranges have been reported as varying from about 520 acres to over 6,000 acres (Reynolds et al. 1992). Primary nesting habitat consists of OFMS cool moist and warm dry mixed conifer stands, often with a dominant presence of large ponderosa pine. These habitats also function as foraging areas. Secondary nesting habitats are generally young forest multi-stratum (YFMS), often lacking the large tree component.

Goshawk surveys were conducted in the project area from 1996 to 2002 (Wildlife Specialist Report, Project Record). There are over 63 documented sightings (incidental observations and formal surveys in and immediately adjacent to the Silvies Canyon watershed) and eight historic (documented use within the last five to six years) or active nest territories in the planning area. Thirty-acre nest core areas and 610-acre Post-fledging Areas (PFA) (larger than the required 400 acres except for the Myrtle Park PFA) have been established around active and historic nest trees. PFAs were not delineated based on the most suitable habitat, but were analyzed at a larger scale than those required in the Malheur Forest Plan to ensure that, where available, adequate amounts of old and young forest habitat were included.

There are at least two additional old territories identified in the area: South Fawn Creek found in 1980, adult near nest site in 1997 and last surveyed in 2000, and Ranger Spring, found in 1991, last active in 1991, last surveyed in 2000, and adult seen near the nest site in 2003. These older territories appear to be inactive based on periodic surveys; because surveys have not been done annually it is unknown whether these nests have remained inactive for the past five years. These old nest sites have had nest stands and 640-acre PFAs designated and have been included in the analysis below. The South Fawn nest stand may have been clearcut in the early 1980s, prior to Forest Plan standards that protected goshawk nest stands. For this analysis, the nest stand was considered to be the timbered stand adjacent to the reported nest location.

Forest structure in goshawk nest stands appears to be mature or old forest or younger forest generally with a closed canopy. The HJ Spring nest is associated with or in close proximity to an aspen stand that is in need of restoration treatment. PFAs below do not include their corresponding 30-acre nest stand.

Forest structure in established PFAs is as follows in Table 3-16, where percentages are based on the 610-acre PFAs. The Regional Forester's Forest Plan Amendment #2 recommends that up to 60% of PFAs be in late and old structure (OFMS/OFSS). None of the goshawk PFAs meets the Forest Plan standard for late and old structure. However, goshawk use of habitat does not meet the silvicultural definitions used in the Blue Mountains. Goshawk use mid-aged, mature, and old forest as described in the Southwest Management Recommendations (Reynolds et al. 1992). In the case of goshawk, YFMS has been included in the analysis of effects with OFMS and OFSS, because YFMS provides the most suitable habitat in the area with many of the structural characteristics needed and used by goshawk for nesting and fledging. It is expected that within many of the PFAs in Silvies Canyon, goshawk are using YFMS or portions of YFMS because OFMS or OFSS are unavailable.

There are five additional nest sites identified outside of but within one mile of the watershed boundary (Rainbow Spring, Five Hundred Flat, and Hall Creek, Lost Cabin, and Crooked Creek). Home range associated with these territories may overlap into the watershed.

Table 3-16. Acres and percentage of area by structural stage within nine[1] goshawk post-fledging areas.

PFA	Grass/forb/shrub and Seedling/ sapling (NF/SI)[2]	Young forest (SEC/SEO/UR)[2]	Mid-aged to mature forest (YFMS)[2]	Old forest (OFMS/OFSS)[2]
HJ Spring	142 ac (23%)	210 ac (35%)	218 ac. (36%)	39 ac (6%)
Van Zandt	108 ac (18%)	452 ac (74%)[3]	49 ac (8%)	0 ac (0%)
Bellows Spring	116 ac (19%)	220 ac (36%)	273 ac (45%)	0 ac (0%)
FL Spring	110 ac (18%)	47 ac (8%)	314 ac (51%)	139 ac (23%)
Myrtle Creek	344 ac (56%)	125 ac (21%)	140 ac (23%)	0 (0%)
Crane Creek	43 ac (7%)	133 ac (22%)	429 ac (70%)	4 ac (1%)
Bennett Spring	223 sc (36%)	61 ac (10%)	29 ac (5%)	297 ac (49%)
Ranger Spring	121 ac (20%)	121 ac (20%)	329 ac (54%)	38 ac (6%)
South Fawn	99 ac (16%)	407 ac (66%)[3]	61 ac (10%)[3]	0 ac (0%)
Reg. For. FPA #2	N/A	N/A	N/A	60%
SW Recommendations (Reynolds et al. 1992)	20%	20%	60%	

[1]Myrtle Park (Blue Mountain) PFA habitat was not included here. OFMS and YFMS represent over 75% of the 640 acres surrounding this nest. Existing condition and effects to the PFA designated by Blue Mountain RD will not be discussed further since no treatment will occur in the Myrtle Park PFA designated by Blue Mountain RD.
[2]Verbal description from Reynolds et al. (1992); structural stage codes from Blue Mountain Forests' structural stage definition.
[3]20% of the Van Zandt PFA is outside the project area and no structures were available in this GIS coverage and 18% of the South Fawn PFA has no structures assigned in GIS; from aerial photos of this 20% of Van Zandt PFA, it is estimated that this area is SEO or SEC. Some of the 18% of South Fawn appeared to be YFMS; the remainder was SEO or SEC.

Indicators of Dead and Defective Tree Habitat

Eleven species were selected as indicators of dead and defective tree habitat because they are Primary Cavity Excavators (PCE), species that create their own nesting cavities in dead or defective trees. By providing habitat for these woodpeckers, habitat is provided for many other cavity-dependant species. Three of these species, (white-headed woodpecker, Lewis' woodpecker, and Williamson's sapsucker) are also listed as "Birds of Conservation Concern" in the Great Basin by the US Fish and Wildlife Service (2002).

Snags may be a limiting factor to woodpecker populations in some areas (see discussion of Dead and Defective Tree Habitat). But while all woodpeckers use dead and defective trees, specific habitat needs vary between species. The Silvies Canyon project area is within the range of the selected woodpecker species (except for yellow-bellied/red-breasted sapsucker-see Table 3-14 under red-naped sapsucker). Pileated, three-toed, and white-headed woodpecker habitat and its availability are described under Indicators of Old Growth, above. The remaining species and their habitat requirements are summarized in Table 3-17.

Table 3-17. MIS for Dead and Defective Tree Habitat.

Bird Species	Habitat/s required	Habitat available?	Presence Confirmed**
Pileated woodpecker	Discussed under old growth-assoc. species	Yes	Yes
Three-toed woodpecker	Discussed under old growth-assoc. species	Yes	Yes
White-headed woodpecker	Discussed under old growth-assoc. species	Yes	Yes
Black-backed woodpecker	Young to old growth mainly lodgepole forest, prefers over-mature/ or disturbed forest for feeding	Yes, declining condition of forested stands helps create this species' habitat.	Yes
Hairy woodpecker	Young to old growth forest, prefers deciduous trees (including aspen and cottonwood) for nesting (Baicich and Harrison 1997, DeGraaf et al. 1991)	Yes, though habitat in decline	Yes
Downy woodpecker	Young to old growth forest, breeds in open woodlands, uses aspen and cottonwood for nesting	Yes, though habitat in decline	Yes
Lewis' woodpecker	Open, lower elevation forest with large snags, prefers ponderosa pine and cottonwood for nesting (DeGraaf et al. 1991)	No-habitat is marginal	No
Common flicker	Young to old growth forest, often near openings.	Yes, ample habitat	Yes
Red-naped sapsucker*	Young to mature forest, prefers mature aspen for nesting (Baicich and Harrison 1997)	Yes, though habitat in decline	Yes
Williamson's sapsucker	Breeds in pine and aspen in mature to old growth ponderosa pine/Douglas fir forest (Baicich and Harrison 1997)	Yes, though habitat in decline	Yes

*** yellow-bellied sapsucker** (*Sphyrapicus varius*) Found mainly east of the Rocky Mountains and in Canada. This species is not known to occur in Oregon. Formerly classified with **red-naped sapsucker** (*S. nuchalis*) and red-breasted sapsuckers as one species. The red-naped sapsucker occurs throughout much of eastern Oregon, including the Malheur National Forest. It will be substituted for the red-breasted and yellow-bellied sapsuckers as a Malheur National Forest MIS.

** Yes = Presence Confirmed, based on one or more sightings recorded in Wildobs database; No = Possible Limited Presence, based on limited habitat present and current range of species.

Featured Species

The Malheur National Forest Plan includes Standards for Featured Species, species of high public interest and demand. Featured species that occur within the project are blue grouse, pronghorn antelope, osprey, and sage grouse. Featured species are briefly discussed here. More information on these species is in the Wildlife Specialist's Report (Project Record).

- Winter roost habitat for blue grouse is present within the project area. District silviculturists state that there is abundant habitat within the Silvies Watershed.

- Habitat for pronghorn is located within sparsely timbered, or non-forest (shrublands, juniper woodlands, and meadows) lands on about 14,445 acres in the project area. Optimum habitat for this species in Oregon is found in open areas. Juniper encroachment is occurring within sagebrush-steppe habitats in the project area.

- Three osprey nest sites exist in the Silvies Canyon project area.

- Sage grouse are discussed above under PETS and in the Silvies Canyon Watershed Biological Evaluation/Assessment.

Raptor Nests

Active raptor nests are protected with period of use restrictions and harvest deferment. Over the last 10 years, 12 raptor nests have been found in the Silvies Watershed (Wildlife Specialist's Report, Project Record). Species known to nest in the project area are Cooper's hawk, red-tailed hawk, osprey, and prairie falcon. There are likely additional raptor nests located within the watershed. New nests may be identified during management activities and would be protected through development of site-specific mitigation measures as needed and appropriate.

Local Land Birds Including Neotropical Migratory Birds

Of the 225 migratory birds that are known to occur in the western hemisphere, about 82 are known to breed on the Malheur National Forest. Nesting generally begins in June in the Silvies Project Area for most migratory songbirds (R. Sutcliffe, Pers. Comm., 2003).

Informal surveys conducted for the Oregon Breeding Bird Atlas (Adamus et al. 2001) and informal walk-through surveys in the project area detected most common neotropical migratory bird species expected to occur on the Emigrant Creek Ranger District.

Trend information displayed in the Wildlife Specialist's Report (Project Record) is based on Breeding Bird Survey data for birds that occur in Oregon as interpreted by Mac et al. (1998) and Sharp (1996). Their data show that many forest-dwelling migratory bird species are in decline. From the Andelman and Stock (1993) research, research conducted by Sharp (1996), trend analysis by Mac et al. (1998), Partners in Flight (PIF) focal species recommendations (Altman 2000), the "Birds of Conservation Concern" in the Great Basin list (US Fish and Wildlife Service 2002), and internal Forest Service reviews, several local NTMBs that are expected to be present in the project area appear to show significant population declines and stand out as warranting attention during this project analysis. Table 3-18 lists these Neotropical Migrants of Concern present in the Silvies Canyon project area and the PIF habitat it represents or habitat elements the species requires. More information on these bird species can be found in the Wildlife Specialist's Report (Project Record).

Table 3-18. Neotropical migrants of concern considered in the Silvies Canyon Watershed Restoration Project analysis.

Bird Species	Habitat(s) required	Habitat available?
Swainson's thrush	Aspen/riparian	Yes, though aspen habitat is in decline.
Olive-sided flycatcher	Mesic (moist) mixed conifer, open forest, uneven-aged with snags	No, though this species may use habitat in the project area opportunistically.
Vaux's swift	Mesic mixed conifer, old growth forest, snags	No, though this species may use habitat in the project area opportunistically.
Chipping sparrow	Open understory ponderosa pine/Douglas fir with regenerating pine	Yes, though the high density of understory trees may be limiting the quality of habitat.
Williamson's sapsucker	Breeds in pine and aspen in mature to old growth ponderosa pine/Douglas fir forest (Baicich and Harrison 1997)	Yes, though aspen habitat is in decline.
Flammulated owl	Mature dry (ponderosa pine) forest	Yes, though quality and quantity of habitat is very limited.
Veery	Riparian woodlands (aspen/cottonwood), understory shrub layer	Yes, though aspen and cottonwood habitat is in decline.
Red-eyed vireo	Riparian woodlands (aspen/cottonwood), canopy foliage	Yes, though aspen and cottonwood habitat is in decline.
Loggerhead shrike	Nests in tall shrubs usually in very open stands/savannah	Yes, though nesting habitat would likely be limited to productive riparian sites and possibly to mountain mahogany stands
Brewer's sparrow	Open, shrub dominated habitats including sagebrush and pinyon-juniper	Yes, though juniper and other trees are encroaching on shrubs in many locations
Sage sparrow	Open sagebrush with scattered bushes	Yes, though juniper and other trees are encroaching on shrubs in many locations
Long-billed curlew	Dry prairie, grassy meadows	Yes though quantity of habitat is very limited

Dedicated and Replacement Old Growth

There are six Dedicated Old Growth areas (managed by Emigrant Creek Ranger District) and a portion of a 7th DOG (managed by Blue Mountain Ranger District) in the Silvies Canyon Watershed. Under the Forest Plan, DOGs 02011-012, 015-017 and 2039 were set aside primarily for the management of pileated woodpeckers. The project area is south of the southern boundary of the current distribution range for marten and the DOGs are not considered optimal or suitable marten habitat.

For this analysis, existing condition of the dedicated old growth areas will be discussed under habitat requirements for pileated woodpecker and marten and in the context of the Forest Plan and the 1992 interim old growth definition (USDA Forest Service 1993).

Data in DOGs were collected during an old growth validation inventory done in 1992 (USDA Forest Service, Malheur N.F. 1993; data on file under "Old Growth" at the Emigrant Creek RD). These data are determined to still be valid. Biologists reviewed the Forest's newest aerial photos (from 2001); no major occurrences, such as blow-down, bug-kill, or fires, have taken place, so habitat changes are expected to have been minimal between 1992 and 2001. Six attributes are used to define old growth using the 1992 (USDA Forest Service 1993) interim definitions:

- The minimally acceptable number of large trees/acre is being met for all DOGs except 02012.
- The minimally acceptable number of large snags/acre is being met for all DOGs.
- The minimally acceptable number of down log pieces/acre is being met for all DOGs.
- The typical range of percent canopy cover for shrub and herbaceous components is being exceeded in all DOGs.
- The typical range number of lower tree layers is being met in DOGs 02011, 02012, 02015, and 02016. Other DOGs have poorly developed second and/or third lower canopy layers.
- All DOGs exceed the highest number of contiguous acres needed to maintain ecological integrity of an old growth stand.

Table 3-19 displays information on DOGs managed by the Emigrant Creek R.D. within the project area. At this time, Forest Plan standards are being met in all but DOG 02012, 02015, and 02039. These DOGs do not have 2.39 snags over 21" dbh, but they do have enough snags to meet the 1992 interim old growth definition. DOG 02039 is slightly smaller than the Forest Plan standard of 300 acres.

Table 3-19. Description of DOGs.

DOG #	Total Acres	Habitat type	% OFMS*	Meets all Forest Plan Standards
02011	344	Warm dry mixed conifer	95%	Yes
02012	482	Warm dry mixed conifer	75%	No, lacks snags
02015	684	Warm dry mixed conifer	84%	No, lacks snags
02016	515	Warm dry mixed conifer	89%	Yes
02017	475	Warm dry mixed conifer	73%	Yes
02039	286	Warm dry mixed conifer	100%	No, DOG is 14 acres smaller than standard, and possibly lacks snags**

*old forest, multi-stratum (OFMS-see Vegetation Specialist's Report for descriptions of forest structures and plant association groups).
** High tree mortality in a 30-acre patch has likely provided more snags.

Replacement old growth and pileated woodpecker feeding areas have not been identified for these DOGs. Habitat adjacent to DOGs is available that may function as feeding habitat and replacement old growth.

DOG 01101 is located on the Blue Mountain Ranger District. A corresponding ROG area was designated in a previous Environmental Assessment. Much of this DOG lies outside the Silvies Canyon Watershed. There are no activities planned in or near this DOG, therefore, it will not be included in this analysis.

Two DOGs have been treated with prescribed fire. DOG 02016 was treated with a very low intensity prescribed burn in 2002. DOG 02017 was treated with a low intensity prescribed burn in 2000. These burns appear to have left components of old growth in conditions similar to 1992. Full descriptions of the DOGs can be found in the Wildlife Specialist's Report, Project Record.

Most of the project area, including old growth, is experiencing reduced stand vigor and increased tree mortality. This is primarily due to stand overstocking, a result of long-term fire exclusion and other management practices (Vegetation Specialist's Report). Old growth and other areas have high fuel loads and above-historic levels of ladder fuels (Fire Specialist Report).

These DOGS meet some of the pileated woodpecker management recommendations developed by Bull and Holthausen (1992), particularly in terms of vegetation types, size of core old growth, and canopy closures. However, these DOGS are not as large as pileated woodpecker home ranges described in Bull and Holthausen (1992) and do not provide down wood, and in most cases snags, at the suggested levels. Current research (Bull and Holthausen 1992) indicates that at least four large snags/acre are needed to provide nesting and feeding habitat for pileated woodpeckers.

Late and Old Structure (LOS), Connectivity, and Fragmentation

Late and Old Forest Structure (LOS) habitat is classified as Old Forest Multi-Stratum (OFMS) and Old Forest Single-Stratum (OFSS).

Under natural conditions, slope aspect, soil productivity, moisture, and fire create a mosaic of vegetation. Historically, the Silvies Canyon area was dominated (40-73% of area) by large blocks of mature pine and pine/Douglas-fir mixed with other seral stands and non-forest types in a broad mosaic pattern (see Vegetation, Chapter 3). High frequency, low-severity fires historically occurred in these dry Douglas-fir and ponderosa pine sites (Tiedermann et al. 2000).

Currently, about 14% of the project area is made up of stands classified as LOS. Almost all LOS (99.7%) is classified as OFMS and almost all (92.6%) is Warm Dry ponderosa pine (PIPO) or Mixed Conifer. The remaining LOS is classified as Hot Dry PIPO. The project area is not currently consistent with HRV (see "Stand Structural Stages – Historical Range Of Variability" on page 3-29).

The productivity of vegetation in the Silvies Project Area environment is limited by low moisture and a short growing season. Warm Dry LOS is capable of sustaining low to moderate canopy closure and can carry 9-17 large (20" dbh or larger) trees per acre depending on aspect. Hot Dry LOS generally has low site potential. It likely can sustain minimal canopy closure ($\leq$29% canopy closure), and can support about 0-9 large trees per acre; slope aspect is typically southern (Vegetation Specialist Report).

Other structures that often provide some quality habitat for pileated woodpeckers, other old growth obligate species, and many canopy dependent species are currently available across portions of the project area. This is mainly made up of mid-aged strata stands (stem exclusion and young forest) with remnant old growth structures (few to several large remnant trees and snags).

Recent timber management and fire suppression have created a more monotypic condition, reduced structure and composition (Vegetation Specialist Report), and somewhat limited the distribution and amount of connective habitat between blocks of LOS found in Silvies Canyon Watershed (Wildlife Specialist Report, Project Record). Most of the LOS that occurs in the analysis area occurs in the Silvies-Myrtle Semi-Primitive Area and in DOGs; these areas are well connected to each other by similar stands forming large blocks of LOS (see Map #28 - Note that this map does not show the blocks of LOS which are connected to and provide connections among the corridors). This area is connected to adjoining subwatersheds with mid-seral aged stands that may provide wildlife movement corridors (Wildlife Specialist Report, Project Record).

Unique and Special Habitats

"Unique habitats" include features such as meadows, cliffs, animal dens, wallows, seeps and springs and are often created by geomorphic features. The project area contains minor areas of talus, rock cliffs and outcrops, and a shallow ice cave.

Special habitats such as riparian (bogs, seeps, and springs), dead and defective tree habitat (snags), dead and down woody material (logs), edge areas, aspen stands, meadows, animal dens, and wallows provide habitat diversity, contribute to the quality and quantity of habitat, and may be an integral part of a plant or animal's life cycle.

Riparian Habitat

There are numerous small seeps, springs, and various classes of streams in the project area. These special habitats are covered in more detail in the Fisheries and Hydrology section of this chapter. Riparian areas provide habitat for numerous wildlife species including spotted frogs, several woodpeckers, and a variety of migratory birds. The condition of this habitat as it relates to wildlife species is discussed in each species' subsection.

Aspen

Quaking aspen habitat supports one of the most diverse wildlife communities in the western United States, yet covers less than 1% of the landmass in the Blue Mountain and Great Basin physiographic provinces. It is one of the most important deciduous tree communities on the Malheur National Forest and is second only to riparian habitat in importance to wildlife. Aspen provides high quality forage, cover, resting, and breeding habitat or is a habitat element for over 50 species of mammals, 150 species of birds, and many amphibians, reptiles, insects and other invertebrates. Due to past management practices and the lack of natural disturbance most of the aspen in the Silvies Canyon Watershed has lost proper functioning condition and is at risk of disappearing from the landscape. The existing condition of aspen habitat is described in detail in the Vegetation Specialist's Report.

Dead and Defective Tree Habitat (Snags)

Snags are defined as completely or partially dead trees still standing and at least 20 feet tall (Thomas 1979). During the decay process of the tree, from recent dead and standing, to dead and lying rotten on the ground or in a stream, snags provide habitat for a wide variety of insects, reptiles, birds, mammals, fish, and plants.

The Regional Forester's Forest Plan Amendment #2 (May 1994) directed that all sale activities would maintain snags >21 inches dbh at 100% Potential Population Level (PPL) or 2.39 snags per acre. Subsequent to Amendment #2 direction, Johnson and O'Neil (2001) invalidated the biological potential models that had been used to determine consistency with Forest Plan standards; they provided no replacement methodology but mentioned a Forest Service tool (DecAID) that was being developed. Very recently DecAID (Mellen et al. 2003) was completed. DecAID is an internet-based computer program developed as an advisory tool to help federal land managers evaluate effects of management activities on wildlife species that use dead wood habitats. The tool synthesizes published literature, research data, wildlife databases, and expert judgment and experience.

DecAID presents information on wildlife use based on snag density and snag diameter. This information is presented at three statistical levels: low (30% tolerance level), moderate (50% tolerance level), and high (80% tolerance level). A tolerance level can also be defined as an "assurance of use" or the likelihood that

individuals in a population of a selected species will use an area given a specified snag size and density. Snag density, size and distribution influence use levels and vary by individual species.

Data in DecAID suggest that snag and down log levels for some primary cavity excavators may need to be higher than the levels based on 100% PPL models. It should be noted that DecAID does not model biological potential or population viability. There is no direct relationship between tolerances, snag densities and sizes used in DecAID and snag densities and sizes that measure potential population levels (LRMP 2002, Thomas 1979).

Snag densities and sizes in the Silvies Canyon were compared against synthesized data in DecAID; data in the large ponderosa pine/Douglas-fir wildlife habitat type were used for comparison (Mellen et al. 2003).

Snag data have been collected in portions of the Silvies Canyon project area (Wildlife Specialist's Report, Project Record). Through a combination of walk-through evaluations, snag transects, and IDT knowledge of stand conditions, it is estimated that current snag densities are about one 15" dbh or larger hard snag per acre in forested stands throughout Silvies Canyon Watershed. This estimated level reflects an overall landscape level estimation; it is not intended to imply that every forested stand or every acre has this level of snags present. Soft snags are also present in most forest stands but were not quantified.

This level of snags does not meet the Forest Plan standard of 2.39 snags per acre over 21" dbh (100% PPL). According to DecAID (Mellen et al. 2003), the project area may be providing habitat at the 30-50% tolerance level for white-headed woodpecker. For white-headed woodpecker, 30% tolerance level equates to 1.1 snags/acre greater than 10" dbh (of which 0.5 snags/acre should be over 20" dbh), and 50% equals 4.0 snags/acre greater than 10" dbh (with 1.8 snags/acre over 20" dbh). The project area is well below the 50% tolerance level for snag density for pileated woodpecker; thus overall, the area may provide only degraded foraging habitat for pileated woodpeckers. DecAID suggests that existing snag sizes could be limiting use by bats and somewhat limiting use by flammulated owl, northern flicker, pileated woodpecker, white-headed woodpecker, and Williamson's sapsucker (Mellen et al. 2003).

While DecAID suggests higher snag densities are needed, data from 1918 compiled by Roy Schwenke (2003) suggest levels of 12" or larger dbh snags may have been closer to 1 to 1.8 per acre on Blue Mountain forests.

The "low" number and size of snags is due in part to low site-potential as well as past forestry practices such as:

- Past harvest practices, which left small diameter live trees (so no large trees were available to become snags),
- Pre-amendment projects which removed snags to the minimum forest standards (40 PPL), and
- Past and ongoing commercial and personal use fuelwood cutting.

Based on slow growth rates and historically low stocking of stands (both from natural conditions and past treatment), the Forest Plan standard for snags may not be attainable at the present time in the project area. In areas with smaller diameter (15" dbh) trees, it may take 30 to 80 or more years for trees to reach the 21" dbh size class. Until that time no 21" snags would be available.

Current patterns of snags and logs are highly variable across the watershed. This pattern is typically associated with environmental gradients, forest composition, successional stage and past forest management.

In 1992, DOG 016 and 017 were evaluated to determine existing dead and defective tree habitat availability. Stand exam data indicated that, prior to prescribed burning, snag densities were capable of supporting about 80-100 percent PPL.

Informal post-prescribed burn monitoring was done in DOG 017. Burning removed a number of snags from the stand but provided replacements at a rate equal to observed losses. While the type of snags removed may be different than the replacements (i.e. level of wood decay, presence of insects and fungus, and structural soundness) the overall snag density was maintained.

Dead and Down Woody Material

Dead and down wood of various stages of decay serves many important functions, one of which is habitat for wildlife. In the Blue Mountains, 179 species of vertebrates (five amphibians, nine reptiles, 116 birds and 49 mammals) make some use of logs (Thomas 1979). The number of invertebrates that use this habitat is not fully documented, but is considered significant. Logs are considered more important element to wildlife than other forms of woody debris. They are more stable and persist longer in the environment than other forms of dead and down woody material (Brown 1970, Wagener and Offord 1972).

Down wood data have been collected in portions of the Silvies Canyon project area (Wildlife Specialist's Report, Project record). Qualitative observations of down wood present in the project area indicate that fair to good numbers of logs are present in forested stands within the watershed. Through a combination of walk-through evaluations, down wood transects, and general knowledge of stand conditions, it is estimated that current down wood levels meet Forest Plan standards for most ponderosa pine sites (3-6 pieces per acre) but may be deficient in mixed conifer stands (15-20 pieces per acre) in Silvies Canyon Watershed. Estimated levels reflect the overall landscape and are not intended to imply that every forested stand or every acre has this level of down wood present.

DecAID (Mellen et al. 2003) provides some information for down logs. The Forest Plan standard (10" diameter at the small end, and at least 12' in length) lies between the 50% and 80% tolerance level for ants and woodpeckers. DecAID does not provide wildlife tolerances for down log densities. It does summarize inventory information across eastern Oregon and Washington; information is presented as percent cover of down logs rather than log length. As with snag densities, DecAID suggests that the Forest Plan standard for down logs is low.

Ongoing tree mortality should increase dead and down woody material densities in many stands. Small diameter woody debris is abundant in most stands, as both old activity slash and from natural accumulations.

Current patterns of down wood are highly variable across the watershed. This pattern is typically associated with environmental gradients, forest composition, successional stage and past forest management.

Other Habitats

Elk wallows, animal dens, and other unique or special habitats are present in the project area and when identified during management activities, will be protected through the development of site-specific mitigation measures as needed.

Recreation

The Silvies Canyon watershed, a high use area in the southern end of the Malheur National Forest, is a destination area for numerous recreation activities. This is due to:

- Its close proximity to Burns, Oregon;
- An extensive and relatively accessible transportation system,
- Presence of rivers, streams, canyons, and other diverse scenery,
- The size of the watershed, which accommodates those seeking a recreation experience with solitude,
- Presence of the Myrtle-Silvies Roadless area.

Roadless Areas

The Myrtle-Silvies Roadless Area offers a setting for individuals seeking a recreation experience with solitude. Big-game hunting, fishing and hiking are currently the primary recreational uses of the area. Other minor uses include Silvies river rafting or canoeing during the spring high water periods, picnicking, camping, horseback riding, recreational gold panning, photography, and nature study. All recreational use within the Myrtle-Silvies Roadless Area is believed to be light. The Myrtle-Silvies Roadless Area is currently being managed with no scheduled timber harvest and no additional roads and has a manageable boundary of 11,776 acres. For more information about this area refer to the section titled "Myrtle-Silvies Roadless Area."

The Myrtle-Silvies Roadless Area represents approximately 4.3% of the 270,200 acres of roadless, semi-primitive and primitive recreation opportunities existing on the Malheur National Forest, including other areas on the Emigrant Creek Ranger District. Additionally, nearly one million acres of roadless primitive and semi-primitive recreation opportunities exist on the Burns BLM District located south of the analysis area. Additional roadless recreation opportunities exist on other public lands within Grant County. These lands include designated Wilderness Areas, Wilderness Study Area, Wild and Scenic Rivers, or other designated areas.

Recreational Uses

Information of regional trends in the Columbia River Basin indicates that hunting, day use, motor viewing and fishing are primary uses of the area (Haynes and Horne, 1997). Residents of Oregon, Idaho, and Washington primarily seek these recreational opportunities. Because there are few developed recreation facilities within the watershed, recreational use consists primarily of dispersed activities of viewing scenery or wildlife, camping, hiking, fishing and hunting. Other activities such as snowmobiling, cross-country skiing, OHV use, horseback riding, and horn hunting are also popular pursuits. Although not commonly considered recreation activities elsewhere, many local people use firewood gathering and Christmas tree cutting as a low cost family outing. Driving for pleasure to look at scenery and wildlife, and picnicking are also popular low-cost activities practiced in the watershed. The area is currently, as well as historically, an

important source for the Burns Paiute tribe to gather native plant materials for medicine, food, traditional crafts, and art, and for ceremonial purposes. Culturally important plant materials gathered include grasses, bitterroot, wild onion, biscuit root, sagebrush, rabbit brush, chokecherry, willow, dogwood, dogbane, juniper, and camas. Regardless of the type of recreational use, access is key to how outdoor recreation resources are used. Recreation places easily accessed by vehicle have higher visitation rates than those located in remote, roadless areas.

Recreation Opportunity Spectrum (ROS)

The Forest Service developed the Recreation Opportunity Spectrum (ROS) system to help identify, quantify, and describe the variety of recreational settings available in National Forests. The ROS system provides a framework for planning and managing recreation resources. The ROS settings are classified on a scale ranging from primitive to urban. Seven elements are used to determine where the setting belongs on the scale:

1. **Visual Quality -** the degree of apparent modification of the natural landscape.
2. **Access -** the mode by which activities are pursued and how well users can travel to or within the setting.
3. **Remoteness -** the extent to which individuals perceive themselves removed from the sight and sounds of human activity.
4. **Visitor Management -** the degree and appropriateness of how visitor actions are managed and serviced.
5. **On-Site Recreation Development -** the degree and appropriateness of recreation facilities provided within the setting.
6. **Social Encounters -** the degree of solitude or social opportunities provided.
7. **Visitor Impacts -** the degree of impact on both the attributes of the setting and other visitors within the setting.

Based on these seven elements the Forest Service assigns one of six ROS settings to National Forest lands. The project area is managed as semi-primitive non-motorized, roaded natural, roaded modified and semi-primitive motorized as stated in the Forest Plan. Recreation opportunities are divided between the motorized (53,676 acres) and non-motorized (9,882 acres) categories. The 53,676 acres of motorized recreation within the analysis area is approximately 4.4% of the 1,197,300 acres available on the Malheur National Forest, including areas elsewhere on the Emigrant Creek Ranger district. Additional roaded recreation opportunities of several million acres exist on other public lands in the area.

- **Roaded Modified –** a natural environment that has been substantially modified by development of structures and vegetative manipulation characterizes. Sights and sounds of humans are readily evident, and the interaction between users is often moderate to high. Facilities are often provided for special activities. Moderate user densities are present away from developed sites. There are 27,065 acres of roaded modified within the project area.
- **Roaded Natural –** A predominantly natural-appearing environment with moderate evidence of the sights and sounds of humans. Such evidence usually harmonizes with the natural environment. Interaction between users may be moderate to high with evidence of other users prevalent. Resource modification and utilization practices are evident but harmonize with the natural environment. Conventional motorized use is allowed. There are 26,575 acres of roaded natural within the project area.

- **Semi-primitive Motorized –** A predominately natural or natural-appearing environment of moderate to large size. Concentration of users is low, but there is often evidence of other users. The area is managed in such a way that minimum onsite controls and restrictions may be present but would be subtle. Motorized recreation use of local primitive or collector roads with predominantly natural surfaces and trails suitable for motorbikes are permitted. There are 36 acres of semi-primitive motorized within the project area.
- **Semi-primitive Non-Motorized -** A predominately natural or natural-appearing environment of moderate to large size. Interaction between users is low, but there is often evidence of other users. The area is managed in such a way that minimum onsite controls and restrictions may be present but would be subtle. Motorized recreation use is not permitted, but local roads used for other resource management activities may be present on a limited basis. Use of such roads is restricted to minimize impacts on recreational experience opportunities. There are 9,882 acres of semi-primitive non-motorized within the project area.

The 1990 Forest Plan sets specific recreation standards for Management Areas. They are as follows:

- **MA 1** - Manage dispersed recreation for roaded modified conditions
- **MA 2** - Manage for dispersed recreation ranging from semi-primitive to roaded modified
- **MA 3A** – Manage for recreation ranging from semi-primitive to roaded modified, depending on the ROS objectives of the adjacent lands
- **MA 4A** – Same as MA 3A
- **MA 5** – Manage for roaded natural
- **MA 10** – Manage dispersed recreation for goals of semi-primitive non-motorized recreation.
- **MA 13** – Provide dispersed recreation setting consistent with adjacent lands
- **MA 14** – Manage for roaded natural recreation.

The ROS setting of a Recreation place largely determines its attractiveness and utility. Many recreation opportunities, such as viewing scenery, require a natural ROS setting; other activities, such as hunting, may not directly depend on the setting. The type of activities that occur in recreation places within the project area can be grouped into two general categories based on the physical setting required for the activity.

- **Land-based Recreation -** Land-based recreation activities occur widely, but are more prevalent in easily accessed areas. The most popular activities are hunting, dispersed camping, viewing scenery, hiking, driving for pleasure, and winter activities. The principle attributes of these places are good access, remoteness from communities and developed sites, parking availability for recreational vehicles, scenery for viewing, seldom used roads to explore, and freedom to choose activities. The vastness of the undeveloped area creates the perception of a natural and remote area.

- **Freshwater-based Recreation -** The Silvies River and its tributaries provide numerous recreational opportunities, including fishing, hunting and camping. The most popular freshwater related recreation places are those that provide opportunities for getting away (solitude), enjoying natural and scenic settings, hunting, and fishing. Other minor uses include Silvies River rafting or canoeing during the spring high water periods.

Dispersed Campsites

Dispersed campsite located within an RHCA

There are 37 known dispersed campsites identified and mapped within the watershed. Other dispersed campsites probably exist within the watershed, but are currently unmapped. Dispersed campsites are easily accessed by roads and can be identified by the presence of rock campfire rings, and/or poles for hanging harvested big game. While many dispersed campsites are associated with hunting camps, about six are also associated with the Silvies River and recreational use in the Myrtle-Silvies Roadless Area. Of the 37 mapped recreation places, eight are located within Riparian Habitat Conservation Areas (RHCAs).

Table 3-20. Dispersed Campsites by Subwatershed and RHCAs.

Subwatershed	Dispersed Campsites	Dispersed Campsites within RHCA
Boulder Creek/Fawn Creek	4	2
Sage Hen creek	7	3
Burnt Mountain	9	2
Stancliffe	1	0
Red Hill	0	0
Myrtle Creek	4	0
Myrtle Park	12	1
Total	**37**	**8**

Trails

Ten and one-half miles of developed trail exist within the analysis area, which is 4.2% of the 258 miles of designated trails on the Malheur National Forest; additional trails exist on other public lands in the area. Trails are the only developed recreation facilities within the analysis area. These trails are within the Myrtle-Silvies Roadless Area and are designed for horse, mountain bike, and hiking use.

This trail system receives moderate use, especially on weekends and during mild weather. In recent years, increasing ORV use on some of these trails (not designated or designed for motorized travel) has resulted in user conflicts and resource damage within the roadless area. Roads closed to motorized vehicles also provide trail opportunities for hiking, horse use, mountain biking, cross country skiing, snowmobiles, and other similar uses.

Myrtle Creek Trail #308

The trailhead is located at the end of Forest Road 3100226 and the ends at the Forest Service Boundary. This trail travels along Myrtle Creek for 8.6 miles. Myrtle Creek provides good small stream fishing and wildlife viewing.

West Myrtle Creek Trail #314

The trail begins at the end of Forest Road 3100440 and ends at Myrtle Creek Trail # 308. This trail descends into Myrtle Creek drainage and dissects Myrtle Creek Trail. This trail provides good scenic viewing as the trail descends into the canyon.

Hunting and Fishing

Hunting season typically draws large numbers of people into the area. Both resident and non-resident hunters use the project area extensively from September to late November during big game hunting seasons. The area is well known as a place to find large mule deer and elk.

The Silvies River and its tributaries are recreationally fished for both warm and cool water fish species. The Silvies River is a natural cool water fishery; warm water fish species have been introduced.

Cultural Resources

The Emigrant Creek Ranger District lies at the northwestern edge of the Great Basin. The majority of its streams drain to the south into Malheur and Harney Lakes, an example of the internal drainage that gives the Great Basin its name. Culturally, the district is also tied mainly to the Great Basin, since most of the indigenous people who utilized these forested uplands and scabflats as a hunting and gathering area centered in the Harney Basin, wintering around Malheur Lake.

Current Condition

Archaeological surveys have been conducted in the Silvies Canyon area since 1978, including surveys completed in 1993, 1998, 1999, and 2003, that were specific to this project. These efforts have resulted in the intensive survey of over 50,000 acres, and the discovery and recording of 255 heritage sites, of which 190 are prehistoric, 39 are historic, and 26 contain both prehistoric and historic components. Many of these sites are considered eligible for inclusion on the National Register of Historic Places, some are considered ineligible, while the eligibility of still others remains undetermined, awaiting further investigation. Table 3-21 lists the eligibility status by site type.

Table 3-21. Eligibility Determination by Site Type.

Site Type	Eligible	Non-Eligible	Undetermined
Prehistoric	172	1	17
Historic	0	13	26
Prehistoric/Historic	4	0	22

Silvies Canyon Project Area as a Part of the Malheur Reservation

Archaeological evidence, earlier ethnographic work, and historic accounts support the information passed on by elders regarding the traditional and continuing importance of this area to the Burns Paiute Tribe. Approximately 20% of the Silvies Canyon Project area lies within the boundaries of the original Malheur

Reservation, which continued north to the summit of the Strawberry Mountain, and east to Monument Rock. The lands included within the Silvies Canyon Project area, the health of the vegetation, wildlife, water, geology, and soils, are integral to the lifeways of members of the Burns Paiute Tribe. Tribal members use these lands for traditional religious ceremonies, hunting, fishing, and the gathering of plants for subsistence, medicinal, utility crafting, artistic, and ceremonial purposes. Today, with the general public taking considerable interest in traditional indigenous lifeways, craftwork can offer commercial opportunities as well. Though members of the Burns Paiute Tribe have become members of the greater Burns and Harney County communities, they have also kept alive traditional lifeways, and continue to pass on knowledge, beliefs and practices to younger generations. Traditional Northern Paiute territory, including the Silvies Canyon Project area, hosted Paiute people long before the coming of Europeans to the region. Many generations were born, lived, and died here, and the importance of this land has to the Paiute people living today cannot be overly stressed.

Burns Paiute tribal members have a vested interest in resources such as dogbane, sagebrush, rabbit brush, dogwood, juniper, bitterroot, biscuit root, chokecherry, willow, quaking aspen, camas, mountain mahogany, cattail, and bitter brush. Other issues considered important to the Burns Paiute Tribe are the potential denial of motorized access to important plant species through road closures, since many elders are not capable of long walks to procure needed plants, and the application of chemicals to noxious weeds in areas that might also contain plants used by tribal members (Jerofke, 2001).

Scenery Management

Introduction

The Scenery Management System (SMS) has replaced the Visual Management System (VMS). Terminology has changed regarding Visual Quality Objectives (VQOs); they are now considered Scenic Integrity Objectives (SIOs). The Scenic Integrity Objectives reflect the goal for the area, while a Scenic Integrity Level indicates the integrity level being met at any one point in time. Table 3-22 shows the transition from the old to the new terms.

Table 3-22. Old and New Scenery Management Terms.

VMS (VQOs)	SMS (SIOs)
Preservation	Very High
Retention	High
Partial Retention	Moderate
Modification	Low
Maximum Modification	Very Low

Viewshed Corridors

Portions of the watershed within Management Area 14 (Viewshed Corridors) encompass those middleground areas that are seen, or potentially seen, from Highway 395, a Sensitivity Level 1 corridor. The management goal for Management Area 14 is to manage corridor viewsheds with primary consideration given to their scenic quality and the growth of large diameter trees. Current Forest Plan direction for the portions of the watershed within MA 14 is to manage middlegrounds as slightly altered

(partial retention visual quality objective) in Sensitivity Level 1 corridors. Under the new Scenery Management System, manage to a moderate scenic integrity objective in the middleground.

Distant views of the Silvies Canyon watershed from Highway 395 provide a slightly altered visual condition. Management activities may be evident, but subordinate to the characteristic landscape (FSM 2382.21(3)).

Existing Conditions

Distant views of the Silvies Canyon watershed from Highway 395 provide a slightly altered visual condition. The visual objective of managing to a moderate scenic integrity objective in the middleground has been met. Therefore, existing conditions within Management Area 14 meet 1990 Forest Plan standards.